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CO-OPERATIVE FIELD TESTS DURING 1891 AND 1892.

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N. C. COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

NORTH CAROLINA

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RALEIGH, N. C.

CO-OPERATIVE FIELD TESTS DURING 1891 AND 1892.

BY F. E. EMERY, AGRICULTURIST.

The numerous field tests formerly conducted in the different sections of the State have been reduced to a few situated on representative soils of the chief geological areas in the State. One locality west and one east of the mountains on the Laurentian formation; one in the south on the older Laurentian, one in the north on the Triassic coal-bearing area, a fifth on the border of the Laurentian with the Quaternary or recent formation, and two widely separated on the latter.

The object sought has been stated in a former BULLETIN:* "The object of experiments in the field is to determine practically by results obtained in Nature's laboratory, what course shall be pursued in growing a given crop on a given soil. We have obtained scientific results in the chemical laboratory, but will these results be reached in the field where the conditions are so changed? ---- The object is two-fold: To analyze the soil and ascertain what in its contents will be useful to the plant, and to discover what elements, or combination of elements, are most necessary to the growth of a certain crop."

It has been learned that certain elements are necessary to plant growth, and that most of these are found in most agricultural soils in quantities sufficient for the growth of plants, and also that nearly always a few, potash, phosphoric acid and nitrogen, are often reduced to so small an amount relatively that remunerative crops cannot be grown without an artificial supply. This is especially true where a soil is drawn upon for more plant food than can become available by natural means in a given time. In such cases the yields diminish, and we cannot tell which of the three, or what combination of them, need to be returned until a sufficiently careful experiment has been conducted, and by inducing the plants themselves to tell what is needed and to interpret the results by observation.

These substations have been so located that their results may be regarded as, in a measure, general for a considerable area around them. Whatever results have been found true in this practical work, they may be considered nearly applicable to other fields in the immediate sections and counties around them. But while this is true in a general way, the previous treatment of any given field may have been such as to require quite a different combination than the one treated experimentally. This makes it necessary for all to

* BULLETIN No. 65, North Carolina Agricultural Experiment Station, p. 24.

become observant, and to make similar tests on different fields in order that the true condition may be found and such combination of elements applied as may give the most profitable crops in return.

In addition to the soil tests of previous years, some varieties of seeds of leading crops have been added for the purpose of finding, if possible, some variety which might prove more productive than those commonly grown in the neighborhood of the test-plats. Possibly some variety might be developed by hybridization from these variety tests which would prove a valuable addition to the varieties grown in the locality where the trial is made.

The fertilizing ingredients used for the soil tests were of the same kinds and were applied in the same forms as detailed in previous BULLETINS, Nos. 58, 65 and 71, but they have been applied to the soil in somewhat different amounts from what were then used.

The acid phosphate was purchased in the Raleigh market at $17 per ton. This contained on analysis:

Moisture at 212° F.	13.69	per cent.
Soluble phosphoric acid	10.94	"
Reverted phosphoric acid	2.46	"
Or available phosphoric acid	13.40	"
Insoluble phosphoric acid	1.93	"

The kainit was also purchased in the Raleigh market at $15.40 per ton. It contained on analysis:

Moisture	7.87	per cent.
Potash	12.20	"
Equivalent to sulphate potash	22.57	"

The cotton-seed meal was a grade lower than the average, and came from the Raleigh Cotton Oil Co, costing $24 per ton. It contained on analysis:

Moisture	7.90	per cent.
Available phosphoric acid	2.42	"
Insoluble phosphoric acid	.20	"
Nitrogen	6.32	"
Equivalent to ammonia	7.67	"
Potash	1.75	"

Stable manure in the same market costs one dollar per load for two horses.

The following shows what was applied to each plat calculated to the acre, and gives the amount used of the phosphoric acid, potash and nitrogen contained in available form, also the total weight of the application and cost in money value. The plats were of one-twentieth acre each, as planned in instructions sent out to each sub-station but these exact proportions were not observed in all cases.

APPLICATIONS CALCULATED PER ACRE.

Plat No.	Application.				Containing Pounds Available.			Cost.
	Acid Phosphate.	Cotton Seed Meal.	Kainit.	Total Pounds	Phosphoric Acid.	Nitrogen.	Potash.	
1	300			300	40.2			$ 2.55
2				None.				
3	200	100	50	300	29.22	6 32	7.85	3.29
4		400		350	9.68	25.28	7.00	4.80
5			300	400			36.60	2.31
6	200	100		300	29.22	6.32	1.75	2.90
7	200		150	350	26.80		18 30	2.85
8	20 two-horse loads stable manure.							20.00
9		200	200	400	4.84	12.64	27.90	3.94
10	100	100	100	300	15.82	6.32	13 95	2.82
11				None.				
12	300			300	40.20			2.55
13	200	100	50	350	29.22	6.32	7.85	3.29
14		400		400	9.62	25.28	7.00	4.80
15			300	300			36.60	2.31
16	200	100		300	29.22	6 32	1.75	2.90
17				None.				
18	200		150	350	26.80		24.40	2.85
19		200	200	400		12.64	27.90	3.94
20	100	100	100	300	15.88	6.32	13.95	2.82
21	20 two-horse loads stable manure.							20.00

Names of Experimenters.

Below is given the name and location of each experimenter, and the general geological formation of each locality. The character of each immediate field is given in the notes for each experiment.

1. R. P. Thomas, Bethlehem, Hertford county. Tertiary.
2. O. W. Sutton, Mount Olive, Wayne county (farm in Duplin county). Tertiary.
3. T. J. King, Louisburg, Franklin county. Border land of the Laurentian and Tertiary.
4. T. B. Lindsay, Douglas, Rockingham county. Jurasso-Triassic, bordered by Laurentian.
5. P. L. Murphy, State Hospital, Morganton, Burke county. Laurentian.
6. Lee Crawford, Franklin, Macon county. Laurentian.
7. W. E. Ardrey, Pineville, Mecklenburg county. Lower Laurentian.
8. Robert P. McAnally, Saxon, Rockingham county. Jurasso-Triassic, bordered by Laurentian.
9. Daniel Lane, Bellair, Craven county. Tertiary. Under the direction of the Horticulturist. See later in this Bulletin.
10. C. D. Tarbell, Southern Pines, Moore county. Also under the direction of the Horticulturist.

The results of this work as given below show a great deal of care and attention from the experimenters and the successful completion of most of the trials. A few, however, were not carried through, and several were lost by combining two tests, although otherwise well carried out and good crops harvested. Owing to sickness at a critical period, Mr. King's experimental crops only received common attention, after having been well commenced, and no reports have been received from him. Drought and excessive rains harmed the crops to a considerable extent, but periods of favorable weather and other favorable conditions made the crops more than equal to the average. The May drought delayed the crop and diminished the stand, while midsummer rains pushed it forward to a large growth and at the same time caused shedding of leaves and shedding and rotting of bolls in cotton fields, but the long dry autumn was so favorable that cotton did better than could have been anticipated, though this droughty autumn so favorable to cotton and corn dealt severely with some other crops.

These substation experiments will be considered in the following order:

Soil Tests, conducted with cotton, corn and tobacco.

Variety Tests, conducted with cotton and corn.

Notes are given with each tabular presentation of single experiments showing the character of soil, the more recent treatment of the field, and methods of making the crop.

The relative appearance of plats at several different times during the season is given, as well as short notes commenting on the more prominent features of each experiment.

I. SOIL TEST EXPERIMENTS WITH COTTON.

The fertilizer soil tests with cotton were made in three localities widely apart—one in the lower piedmont region, one intermediate towards the east, and the third in the coastal region. They are respectively as below:

1. Soil Test with Cotton.

CONDUCTED BY CAPT. W. E. ARDREY, PINEVILLE, MECKLENBURG COUNTY, N. C.

Character of Soil.—Sandy, with clay subsoil.

Operations of Season.—Opened with two-horse plow, and fertilizers distributed according to formula. Bedded in usual way. Planted April 28th, but did not come up until May 20th on account of dry weather. Stand very poor. Sided May 24th. Hoed to a stand June 1st, and badly damaged by a heavy hail-storm June 4th. Plowed with sweep June 13th; hoed second time 21st; plowed third time 26th and 27th. Crop perfectly clean at end of June.

Rank for June: 1st, No. 21; 2d, Nos. 8 and 13.

July 8th, plowed fourth time; hoed on 10th and 15th.

Rank for July: 1st, Nos. 20 and 21; 2d, No. 19; 3d, No. 8.

Rank for August: 1st, No. 21; 2d, Nos. 1, 4, 6 and 9; 3d, Nos. 13 and 19.

Average per cent. of lint from variety tests of Ardrey's Peterkin was, lint 35.21 and seed 64.67. Seed cotton was calculated at $25.67 per 1,000 pounds.

Area of plats, one-twentieth of an acre. Results calculated to one acre.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with average of three unfertilized plats, after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Pounds.	Average Pounds.	Value.	Net Gain.	Net Loss.	
1 12	300	-------	-------	$ 2.55	1,320 1,140	1,230	$31.62	$2.37	------	3
2 11 17	-------	-------	-------	.00	1,040 1,080 1,000	1,040	26.70	------	------	--
3 13	200	100	50	3.29	1,240 1,180	1,210	31.06	1.07	------	6
4 14	-------	400	-------	4.80	1,280 1,360	1,320	33.89	2.38	------	2
5 15	-------	-------	300	2.31	1,000 1,300	1,150	29.52	.51	------	7
6 16	200	100	-------	2.90	1,240 1,040	1,140	29.27	------	0.37	8
7 18	200	-------	150	2.85	1,200 1,240	1,220	31.32	1.77	------	5
8 21	20 two-horse loads stable manure.			20.00	1,440 1,480	1,460	37.48	------	9.22	9
9 19	-------	200	200	3.94	1,320 1,240	1,280	32.86	2.22	------	4
10 20	100	100	100	2.82	1,160 1,360	1,260	32.35	2.82	------	1

Conclusions.—The soil responded to the fertilizers in nearly every case, and on most of the plats increased the yield enough to pay for the application. Stable manure gave far the greater increase, but the cost was so great that for this crop considerable loss resulted. We believe, however, that while in other cases the soil may have been somewhat reduced, the stable manure left the land in far better condition.

2. Soil Test with Cotton.

CONDUCTED BY MR. O. W. SUTTON, MOUNT OLIVE, WAYNE COUNTY (FARM IN DUPLIN COUNTY), N. C.

Character of Soil.—Stiff, with clay subsoil; well-drained. Land rested in 1889. One bale of cotton per acre in 1890, with cotton seed and acid phosphate for manure.

Whole area 60 by 60 yards; each plat 10½ feet by 60 yards, equal to one-twenty-third of an acre. Fertilizers applied according to instructions. Planted with planter April 25th. Failed to grow until late in May, and then stand was poor. Below No. 10 test is regarded as unfair.

Report for June very discouraging. Nos. 8 and 3 best.

Report for July not very encouraging. Rank: Best, No. 8; Nos. 4, 9, 14 and 19 about equal, 2d. Poorest, Nos 11, 1 and 5, 2d.

Much blank space in plats 11 to 20, and yield in those is very small.

Rank in August was: Best, 8 (10, 13, 14) and 4 and 9; poorest, 1, 11, 12 and 5.

But two pickings, the first being on October 12th.

Mr. Sutton could not bring himself to leave so much land unfertilized as required in the plan, so dropped out the two end plats without manure.

The values calculated on seed cotton are taken from the average per cent. of seed and lint found for all varieties in seed test with cotton at Mount Olive. This is four cents per 1,000 pounds of seed-cotton more than if calculated on average per cent. of seed and lint found in seed tests for Sutton's Peerless, which were 67.00 and 31.60. Value of seed-cotton per 1,000 pounds was $23.64.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with one unfertilized plat after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Pounds.	Average Pounds.	Value.	Net Gain.	Net Loss.	
1 12	345	.....	.....	$ 2.93	788 / 759	714	$18.29	.....	$4.05	9
3 13	230	115	57½	3.78	1,035 / 897	966	22.84	.....	0.34	3
4 14	.....	460	.....	5.52	1,125 / 886	1,006	23.78	.....	1.15	4
5 15	.....	.....	345	2.66	920 / 828	874	20.66	.....	2.20	5
6 16	230	115	.....	3.34	978 / 759	869	20.53	.....	2.21	6
7 18	230	.....	172½	3.28	943 / 725	834	19.72	.....	2.92	7
8	20 2-h'se	l'ds st'b.	manure	20.00	1,702	1,702	40.24	0.84	.....	1
9 19	.....	230	230	3.73	1,242	966	22.84	.....	0.30	2
10 20	115	115	115	3.24	1,162 / 449	806	19.04	.....	3 65	8
11	.....	.....	...	0.00	824	824	19.40	.....	.....	--

Conclusions.—The one unmanured plat being included in the area where the stand was poor (plats 11 to 20 inclusive), comparisons would manifestly be unfair. But still half of the plats have also been reduced, and yet the result of such comparison does not show much increase due to the fertilizer. Only plats 3, 4, 6, 8, 9 and 10 gained enough in net value of crop to pay a small balance above cost of manure above the value of crop from unmanured plat. These were all overbalanced by loss on the duplicates, so there is only one plat, the one dressed with stable manure, which shows a balance, and that one was not duplicated. This plat with stable manure gave a very good crop, and indicates that a line of stock husbandry might be followed on this kind of soil or in this locality with great advantage to the crops.

3. Soil Test with Cotton.

CONDUCTED BY DR. R. P. THOMAS, BETHLEHEM, HERTFORD COUNTY, N. C.

Character of Soil.—Medium stiff soil, with clay subsoil. Drainage good. Corn in 1889; manured with about twenty bushels of cotton seed per acre; yield about twenty bushels In cotton in 1890; manured with 200 pounds of guano per acre; yield about 1,000 pounds of seed cotton.

Field Notes.—Land plowed last of March. Bedded last of April. Whole area, one and eight-twentieths acre; each plat one-twentieth of an acre.

Applied fertilizers in drill. Seed sowed April 30th, 1891, with corn planter. Cotton did not vegetate until May 22d, and dried so badly it was not worked out this month. A poor stand, and two weeks late. Rank of four best and poorest is given in order: Best, 22, 13, 21 and 3; poorest, 17, 15, 11 and 5.

June 2, scraped and chopped. June 3, dirted up with plow. June 9, grassed and plowed. June 18, plowed. June 24, grassed and plowed. June 30, plowed. Rank at end of June: Best, 22, 3, 13 and 8; poorest, 17, 15, 11 and 5.

July 7, grassed out with hoe. July 9, plowed. July 17, plowed. July 28, grassed out with hoe. July 31, plowed Last plowing delayed by wetness of field.

Where cotton-seed meal was used cotton has stood wet weather best. Where acid phosphate was used the cotton has not done well in wet weather.

Rank at end of July: Best four, 22, 8, 21 and 19; poorest four, 11, 17, 2 and 15.

August 10, grassed out with hoe and plowed last time.

Rank: Best, 22, 8, 21 and 19; poorest, 11, 17, 2 and 12.

Variety of cotton planted, Peterkin No. 14, of variety test. Average per cent. of lint found in three seed tests, 34.21; average per cent. of seed, 65 86. Price of lint, six and one-eighth cents; seed, seventeen cents per bushel of thirty pounds. Value of seed-cotton per 1,000 pounds, $24.69.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with average of three unfertilized plats after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Pounds.	Average Pounds.	Value.	Net Gain.	Net Loss.	
1 12	300	.....	.....	$ 2.55	766 710	738	$18.22	.....	$ .69	8
2 11 17	.....	.....	.....	.00	640 674 619	644	15.91	.....	.....	--
3 13	200	100	50	3.29	839 879	859	21.21	2.01	.....	5
4 14	.....	400	.....	4.80	924 925	875	21.54	.83	.....	7
5 15	.....	.....	300	2.31	691 643	667	16.47	.....	1.75	9
6 16	200	100	.....	2.90	826 888	857	21.11	2.30	.....	4
7 18	200	.....	150	2.85	808 874	841	20.77	2.01	.....	6
8 21	20 two-horse loads stable manure.			20.00	1,240 1,220	1,230	30.32	.....	5 54	10
9 19	.....	200	200	3.94	954 971	963	23.76	3.90	.....	2
10 20	100	100	100	2 82	888 860	874	21.58	2.85	.....	3
21	1000 lbs home-made guano.			8.40	1,203	1,203	29.70	5.39	.....	1

Conclusions.—In this field, acid phosphate gave a loss with a gain on the duplicate plat which did not prevent a small balance of loss. Kainit alone made the greatest loss, unless we except the stable manure, the cost of which was so much greater that, although the greatest benefit resulted from the application, the value of the increase of crop left a greater loss than from any other application. We should expect from this a considerable residual value from this stable manure extending over and improving the crops and physical condition of these plats, 8 and 21, for several years. On this point the following season Dr. Thomas writes: "The benefit to the crop the following season was very perceptible from stable manure and home-made guano. While I noticed the crop very carefully the following season I did not weigh it." It is quite probable that the costly stable manure was a good investment in the end.

Nitrogen alone made a good gain on one plat and a small loss on the duplicate, but a profitable gain on both.

The union of two elements gave a profitable return in each case; that of phosphoric acid and nitrogen greater than phosphoric acid and potash, but less than nitrogen and potash.

The smaller application of three elements gave a greater net return than did the larger, owing, perhaps, to the better balance between the elements

Had there been another plat with 100 pounds each of acid phosphate and kainit, and 150 pounds of cotton-seed meal, the combination would doubtless have proved better than any of the others for this land.

The home-made guano was the most profitable application made.

II. SOIL TEST EXPERIMENTS WITH CORN.

Unfortunately, two of the three soil tests with corn were combined with the variety tests, and the experimental value of the data collected was thus lost.

1. Soil Test with Corn.

CONDUCTED BY LEE CRAWFORD, FRANKLIN, MACON COUNTY, N. C.

Character of Soil.—Red clay.

Field Notes.—Corn in 1889 and wheat in 1890. No record of yields. Well broken two ways with bull-tongue, then pulverized with Acme harrow. Fertilizer applied to every other row 528 feet long. Planted May 7th, 1891. Rows four feet apart, hence plats are $\frac{8}{165}$ of an acre.

Rank in May: Best, Nos. 1, 13 and 14; poorest, 2, 11 and 4, in the order named. Plowed and hoed May 25th.

Rank for June: Best, Nos. 1, 3, 14, 13 and 7; poorest, 17, 11, 2, 16 and 19, in the order named.

Plowed and hoed twice, June 5th and 26th. Has been checked slightly by dry weather. Good rains have been timely for these plats. Cultivated and hand-hoed July 6th, and worked on the 21st.

Rank for July: Best, 3 (6 and 8), 20, 1 and 15; and poorest, 11, 2, 17, 8, 7 and 12.

in the order named. Rank for August: Best, 12, 1 (8 and 18), (4 and 15), 19; and poorest (2, 17 and 11), 12, 20, (3 and 6), 9. Rank September 15th: Best, 1, 12, 18 (8 and 14), 5, 7; and poorest (2 and 17), 11, 10, 20 (3 and 6), (13 and 16).

Impracticable to weigh fodder in this or the variety test.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with average of three unfertilized plats after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Pounds.	Average Pounds.	40c. per Bus. of 80 lbs.	Net Gain.	Net Loss.	
1 12	309.4	.....	.....	$ 2.63	1,643 1,673	1,658	8.29	$1.47	.....	1
2 11 17	.....	.....	.....	.00	907 826 786	840	4.19	.....	.....	--
3 13	205.2	103.1	51.6	3.39	1,693 1,249	1,471	7.36	.....	.22	3
4 14	.....	412.5	.....	4 95	1,411 1,370	1,391	6.96	.....	2.18	8
5 15	.....	.....	309.4	2.38	1,411 1,350	1,381	6.90	.33	.....	2
6 16	206.2	103.1	.....	2.99	1,592 1,643	1,618	8.09	.....	.91	4
7 18	206.2	.....	154.7	2.94	1,431 1,008	1,220	6.10	.....	1.03	5
8 21	20.6 two-horse stable	loads manure.		20.60	1,511 1,269	1,390	6.95	.....	17.84	9
9 19	.....	206.2	206.2	4.06	1,129 1,411	1,270	6.35	.....	1.90	6
10 20	103.1	103.1	103.1	2.91	1,008 1,028	1,018	5.09	.....	2.01	7

Conclusions.—This trial shows acid phosphate to have been the dominant ingredient. The largest yield was made by the combination on plat 3, but there was too little increase over the plats with only a single application (1 and 12) to be of consequence. Cotton-seed meal and kainit both had a notable effect in increasing the yield six to seven bushels per acre. Kainit made a small cash gain, but cotton-seed meal a considerable loss on account of high cost.

Considering the action of the single application of phosphoric acid, it is surprising that the combinations of two and three elements did not increase the crop more with potash and nitrogen present when more phosphoric acid was available than when acid phosphate was used alone. It seems probable that there was a lack of organic matter, and perhaps of water, at a vital stage of growth; also, that the crop could gather enough potash from the red clay for the largest yields when phosphoric acid and nitrogen were present, but with nitrogen absent the yield did not come up so well, and with phosphoric acid absent from the combination fell to about the effect of single applications.

III. EXPERIMENTS WITH CORN VARIETIES AND SOIL TEST COMBINED.

1. Conducted by State Hospital, Morganton, Burke County, N. C.

Character of Soil.—Naturally well-drained slope underlaid with stiff red clay which is very near surface.

Field Notes.—Nothing grown on this land in 1889; ensilage corn 1890 with commercial fertilizers. Prepared by subsoiling ten inches, rolling and harrowing. Area, 70 x 210 yards; plats 4 x 70 yards, with two yards between each plat. Fertilizers applied as directed May 1st. Corn dropped in check and covered with a hoe, harrowed and rolled. June: Cultivated by plowing with straight plow and hoed on 1st and 17th. Plats 1 and 14 are poor ground. July 8th, plowed and hoed. These plats have not suffered through the dry season like other corn planted near it, and think it was saved by the deep subsoiling.

The notes were well-kept and sent in, and a fine crop was harvested. Weights are not given, since from the combination of varieties with soil test plat, differences can neither be ascribed to the one or the other cause, and hence are omitted to prevent any mistaken conclusions from being drawn. These plats showed what good, deep plowing may accomplish on red clays. Only one plat yielded less than 18 bushels per acre at 80 pounds harvest weight per bushel, while the average was 26 bushels, and this on land which was regarded as *rather too poor* to put a crop on. The *subsoiling paid* here.

2. Conducted by T. B. Lindsay, Douglas, Rockingham County, N. C.

Character of Soil.—Sandy loam; good natural drainage.

Field Notes.—In grass two years with no manure; yield about one ton of hay per acre. Plowed with two horses; harrowed and cultivated with Iron Age Cultivator, and reharrowed. Whole area 245 x 176 feet; each plat 176 x 12$\frac{3}{4}$ feet, equal to one-twentieth of an acre. Fertilizers mixed with twice their quantity of rich earth and sown broadcast. Stable manure sown broadcast. Corn planted with planter May 4th. June 8th, cultivated with Iron Age Cultivator, hoed and thinned. June 16th, plowed with narrow shovel plow and hoed between hills. Dry weather last two weeks of June hindered growth. Cow peas sown in corn (at last cultivation) June 24th. Weather considered too wet in July and August for best results.

A fine crop harvested from nearly every plat, but the same remark made in last test applies here—a union of soil test with variety tests prevents gains or losses from being ascribed to either variety of corn or to the fertilizer. The best yield was 52 bushels of 80 pounds each per acre with 20 loads of stable manure, closely followed by the King variety of corn, 51$\frac{3}{4}$ bushels, with the complete fertilizer of plat 13; the Murphy 51$\frac{1}{2}$ bushels, and the Sutton 51$\frac{1}{4}$ bushels, on soil test plat 10. The poorest yields were 27 bushels from Clark's Early Mastodon, plat 1, and Improved Golden Dent, 29 bushels, from plat 2 with no fertilizer. The land was in good condition to produce a crop, and on such lands commercial fertilizers usually have their most profitable effect.

IV. SOIL TESTS WITH TOBACCO.

Since tobacco is one of the chief money crops of the State and a staple article on which depends the welfare of a considerable industry, it is of the utmost importance to gather some reliable data on the behavior of the new tobacco lands with the different elements of plant growth supplied in commercial fertilizers. In planning this test care was taken to add different amounts of potash salts both as sulphate and chloride, and apply under like relations to other necessary plant food which should be present in quantities sufficient to supply the needs of as large a crop as would be likely to be produced. This would give a soil test combined with test to ascertain the best form and amount of potash to use.

The following instructions were prepared to send out to experimenters with this soil and potash test, accompanied with a supply of blanks for monthly notes to be returned to the Experiment Station as filled out.

SOIL TEST WITH VARIOUS FERTILIZERS ON TOBACCO.

Instructions for Conducting the Soil Test.

Object.—First, to determine which fertilizing element or combination will give most desirable growth and quality of tobacco. This soil test in itself can show only the growth and texture of the crop, and it may furnish something of a guide for future practice in the application of fertilizers for the neighborhood in which the trial is made. This is the soil test. The effect of the fertilizers on the composition and curing of the leaf is to be studied later.

Some Details to be Observed.—Select a good uniform soil which is moderately rich and of as even texture as possible. For the best effect a *soil test* should be made on land representative of the great body of tobacco land in your neighborhood.

The total area required for this test will be very nearly one and seven-eighths acres; 88 yards one way by 104½ yards the other. A very convenient size and form of plat will be obtained by laying off the plats 88 yards long by 5½ yards wide. Make the space between the plats two feet. Having laid off 17 plats thus, set up a stake at the outside line of the first and last plats 44 yards from each end and put in a row of stakes, two to each plat, in line with the corner stakes between these, thus dividing each plat into two equal sections, which we will call "Section A" and "Section B," thus:

"Section A," 5½ yards by 44 yards.	"Section B," 5½ yards by 44 yards.

Plow and pulverize the soil as thoroughly as usual. Lay off the rows three feet and four inches apart, starting half that distance from the corner stakes of one side of each plat, and ending the same distance from the stakes on the other side. This gives five rows per plat.

Either sow the fertilizer in the rows or sprinkle it in the hills. In either case be careful to thoroughly mix it with the soil.

This method of application insures the plants obtaining the maximum amount of the fertilizer, and mixing it with the soil will prevent any excess of acid in any one from injuring the plants.

These fertilizers have been prepared with the view of combining a soil test with a trial of the form and amount of potash salt best suited to tobacco. It will be noticed that where kainit is used three adjacent plats receive the same amounts of

acid phosphate and cotton-seed meal, but No. 7 double and No. 8 treble the kainit used on No. 6.

The same is true with potassium chloride and sulphate. It is desired to make comparative notes of the growth and relative development of these plats with great care, in order the better to study the behavior of the different forms of potash in nourishing the crop. Later directions will be sent for sampling the crop for a chemical examination of the plant.

After having prepared the land, applied the fertilizers and set the plants, cultivate in the usual way, but observe to make cultivations at frequent dates and very shallow, just enough to keep the surface mellow and fine, and prevent a crust or the growth of many weeds. Be careful to keep a diary of operations and to report the same on the monthly blanks. As early as possible after planting this soil test fill and return the schedule for "Recording Data of Experiment," giving correct answers to all the questions, and mail it as directed at the top. At harvest, if you can do so, weigh the crop from each plat as it goes to the curing barn. Preserve the crop from each plat by itself while curing, and when cured sort each lot and weigh each quality so as to fix the money value of each lot. Fill out and send as directed one of the monthly report blanks every month. Use one of the monthly reports for the yields of crop, giving pounds and ounces in columns under each section in the middle of the page. The next columns can be used to give rate per acre, if desired, and last column *rank* in yields by weight and by value. Or there may be a different arrangement to show amounts of different qualities and prices, both of which you will give in a heading at the top of the column (as name of quality, and price per pound).

Three lots of the fertilizers were prepared and sent out to the regular substation at Douglas, in Rockingham County, and the other two to active and careful farmers in the same county, at about the same distance from Madison, N. C. The experimenters in charge of these soil tests were, Mr. T. B. Lindsay, Douglas, N. C.; Mr. Robert P. McAnally, Saxon, N. C., and Mr. J. V. Price, Hogan, N. C.

The soil dried out so rapidly after a heavy rain, and continued so dry, that Mr. Price had no opportunity for making the application, and the test was not made. Messrs. Lindsay and McAnally carried through the tests, but Mr. Lindsay's was injured by a difficulty in being unable to secure even a fair stand, and the worms were so numerous that what he succeeded in curing, after so troublesome a fight with the worms, was worth only six cents per pound.

Of Mr. McAnally's tobacco, samples were forwarded to Raleigh for analysis or burning, or for both these tests of its quality. This lot is specially fit to show difference in burning quality, if fertilizers can make any difference on these bright tobacco soils, since it was grown on new land, and because sufficient land not being available for 1-20 acre plats, as expected, the same weights were applied to smaller plats, giving an application 66.1 per cent. heavier than was expected. Mr. McAnally has found heavy fertilizing profitable in his field work, and while the application as planned was above the usual applications in that region, these results are much nearer amounts which are used there with most profitable net returns.

Soil Test with Tobacco, including Test of Best Form of Potash.

CONDUCTED BY ROBERT P. M'ANALLY, SAXON, ROCKINGHAM COUNTY, N. C.

Character of Soil.—Dark grey sandy land, newly cleaned. This was first crop.

Notes.—The area was necessarily reduced from not having enough available land cleared. Area of plats 160 square yards, equal to $\frac{4}{121}$ of an acre. Planted with Improved Flannagan variety of tobacco on May 23d Section B, and 25th Section A. June 11, worked out both sections with Kretsinger's Champion Potato Hook, a perfect implement for thoroughly pulverizing and loosening up the soil; 20th, plowed with bull-tongue; 25th, all hoed out thoroughly.

Rank at end of June: Best, 12, 16, 11, 10, 15; poorest, 5, 13, 3, 2, 1.

July 3d, plowed; 9th, hoed and hilled up; 17th, plowed with turn-plow; 20th, all topped over; 26th, damaged by hail, estimated to be about five per cent.; 30th, all wormed, suckered and topped.

Seventy-five per cent. of plants on plat 3 has yellows; 20 per cent. of plants on plat 5 has yellows.

So much rain in three weeks of July makes it impossible to see difference between plats 5, 6, 7, 8, 10, 11, 12, 14, 15, 16. It is all extra fine; 10, 11, 12 and 16 regarded best in this order.

August: All except the plats where no fertilizer was used are in fine condition and ripening all right; 28th, stripped off the stalk to cure on the Snow, or wire stick,* all of that topped on July 20th.

* Description of this process of curing may be found in Bulletin No. 86 of this Station entitled, "Tobacco Curing by the Leaf Cure on Wire and the Stalk Processes."

SOIL TEST WITH TOBACCO, CONDUCTED BY R. P. McANALLY, SAXON, ROCKINGHAM COUNTY, N. C.

Applications in Pounds Per Acre.

No. of Plat.	Acid Phosphate.	Cotton-Seed Meal.	Kainit.	Potassium Chloride.	Potassium Sulphate.	Containing Pounds Available.			Cost	Grades.				Total Weight. Pounds.	Total Value.	Average Value per Pound (cents).	Net Result.	Rank.
						Phosphoric Acid.	Nitrogen.	Potash.		First. Pounds.	Second. Pounds.	Third. Pounds.	Fourth. Pounds.					
1	.....	581.7	..	..	.....	13.09	38.04	10.94	$ 6.98	60.5	211.8	257.1	317.6	847	$ 98.31	11.60	$ 10.26	15
2	930.8	..	..	..	.....	120.54	.....	.....	7.91	90.7	302.5	181.5	302 5	877.3	112 83	12 88	23.85	13
3	.....	..	..	..	114.34	.....	..	58 63	2.86	121	211.8	287.4	317 6	937.8	116.77	12 45	32 84	12
4	930.8	581.7	..	..	.....	133.63	38.04	10.94	14.89	151.3	378.1	242	286.2	1,058 7	145.20	13.65	49.15	10
5	.....	..	..	..	.....	.....	.....	.....	.....	37.8	174.0	302 5	272.3	786 5	87.12	11.07	.....	16
6	930.8	581.7	245.9	..	..	133.63	38.04	39.91	16.78	105.9	272 2	484	317.6	1,179.7	142.18	12 05	44.33	11
7	930 8	581.7	491 8	.....	...	133.63	38 04	68.88	18.67	242	514.3	211.7	272.3	1,240.3	186.04	15.00	76.30	8
8	930 8	581.7	737.7	..	..	133.63	38 04	97.84	20.56	181.5	705.6	242	287.4	1,416.5	202 68	14.31	101.05	4
9	.....	581.7	..	..	114.34	13.09	38.04	69.57	9.84	90.8	423.5	310	295	1,119.3	145.20	12.97	54.29	9
10	930 8	581.7	..	171.5	..	133.63	38 04	97.85	18.32	272.2	756 3	211.7	302 5	1,542.7	237 46	15.40	138.07	1
11	930.8	581.7	.....	114.34	..	133.63	38.04	68.88	17.18	317.6	635.2	226.9	272 3	1,452	226.88	15 63	128 63	2
12	930.8	581.7	..	57.17	...	133.63	38.04	39.91	16.03	242.0	574.8	272 3	272.2	1,361 3	202.68	14 89	105.58	3
13	..	..	..	..	.....	.....	.....	.....	.....	30.2	166.4	226.9	242.0	665 5	75.02	11.27	.....	17
14	930.8	581.7	..	..	57.17	133.63	38 04	40.25	16.32	317.6	484	90.8	226.9	1,119 2	184.53	16 49	87.14	6
15	930.8	581.7	..	..	114 34	133.63	38.04	69.57	17.75	272.2	434	196.6	226 9	1,179.7	183.01	15.51	84.19	7
16	930.8	581.7	..	..	171.51	133.63	38.04	98.88	19.18	204.2	574.8	242.0	244.5	1,265.5	189.06	14.94	88.81	5
17	930.8	.....	.....	.....	114.34	120.54	.....	58.63	10.77	121.0	242.0	272.3	242 0	877.3	114.95	13.10	23.11	14

After curing the tobacco grown on these plats, Mr. McAnally sorted the tobacco from each plat very carefully into four grades, to which he attached a money value differing according to ratings of the Madison market. These calculations gave the total value column of the preceding table, which shows the kind and amount of each fertilizer applied to each plat, and also amount of available phosphoric acid, nitrogen and potash in the applications. The "net result" is the excess of "total value" of any one plat crop over the total value of crop on the average of unmanured plats, less the original cost of application, no allowance being made for handling or freight on manure.

Discussion.—This soil responds handsomely to applications of single elements.

Potash gave the highest returns in yield, total value, and net gain, though average price per pound when graded fell a little below that produced from the application of phosphoric acid.

Nitrogen of cotton-seed meal, when applied alone, gave the lowest result of the three in every respect, notwithstanding there were small amounts of both potash and phosphoric acid contained in the meal. It seems that tobacco needs a larger application of phosphoric acid and potash than was contained in the application of cotton-seed meal, yet it had a notable effect alone, and when combined with either phosphoric acid or potash, the resulting crop was increased in every respect, amounting in net results to about doubling the net result of the ash element without the nitrogen. The union of nitrogen and phosphoric acid gave the higher price per pound, while nitrogen and potash led in respect to total yield, total value, and net result.

Phosphoric acid and potash combined, without nitrogen, on plat 17 gave no better result than was obtained from plat 2 without potash, and not nearly as good result as that of plat 3 without phosphoric acid. This cannot be easily explained, since the position and close correspondence of the plats with nothing would indicate a very uniform soil. The requirement of the soil for each of the three leading ingredients appears to have been so evenly balanced that either of the two ash elements could produce as much crop alone as both without nitrogen, while with nitrogen added, either could increase the crop nearly equivalent to the sums of the increase by itself and nitrogen when used alone. Potash more than this sum and phosphoric acid less.

The best results have been attained where the three elements were combined, thus :

The highest yields of cured tobacco from plats 10, 11 and 8.
The highest cash value of crop from plats 10, 11 and 8 or 12.
The highest average value per pound from plats 14, 11 and 15.
The highest net results in cash from plats 10, 11 and 12.

It may be well to notice here that the greatest yields resulted from the use of a fertilizer containing—

	Phosphoric Acid.	*Nitrogen.*	*Potash.*
On plat 10,	7.82 per cent.	2.26 per cent.	5.81 per cent.
On plat 11,	8.21 per cent.	2 34 per cent.	4.23 per cent.
On plat 8,	5.94 per cent.	1.69 per cent.	4.35 per cent.

Two of these also produced the highest cash value, while plat 8 was equal to plat 12 in this respect, and this plat was third in best net results with a fertilizer containing 8.51 per cent. phosphoric acid, 2.42 per cent. nitrogen and 2.54 per cent. potash.

Plats 14 and 15 were concerned with plat 11 in producing the highest average value per pound, though only 6th and 7th in net result, the point of greatest vantage. The fertilizer for these plats contained—

	Phosphoric Acid.	*Nitrogen.*	*Potash.*
On plat 14,	8.51 per cent.	2.42 per cent.	2.56 per cent.
On plat 15,	8.21 per cent.	2.34 per cent.	4.28 per cent.

The test for the best form of potash consisted in using three different amounts of potash in *kainit* (where potash is contained in both sulphate and chloride), in *potassium chloride* (muriate of potash) and in *potassium sulphate*, and taking enough of each to approximate the same amount of potash from each source. In this trial these amounts were nearly 40, 69 and 98 pounds per acre.

In the above discussion those plats on which *potassium chloride* was used have been shown to have excelled all others in total product in net cash value, and in total cash value, save that the heaviest application of *kainit* balanced the lowest of *potassium chloride* in total cash value, and stands next to it in net result, while the lowest application of *potassium sulphate* resulted in giving the highest price per pound.

These results are given without the test of burning. Chloride is known to be easily assimilated by tobacco*, and this form is considered objectionable as producing a poorly burning leaf for this reason. However, results have not all been harmonious, one remarkable instance of a very good burning tobacco being recorded† where a heavy application of night soil was made. Potassium sulphate is a good form of application, there being no objection on the score of burning. Hence, if on burning samples (which have been preserved) of these plat crops any decided lack of the burning quality is found for those grown from *potassium chloride*, or *kainit*, the greatest value would then rest on plats 14 to 16, on which potassium sulphate was used. This experiment has been repeated on nearly similar ground on the same farm, and samples of this second crop may be examined later.

*See Storer's Agriculture. p. 130.
†Ibid, p. 129.

V. VARIETY TESTS.

The object in making these trials of varieties of cotton and corn was to compare a number of leading varieties with those grown at the substations, and to increase the crops, if possible, by substituting more prolific varieties for those grown; to assure ourselves the best are in cultivation; or, perhaps, to secure a hybrid from the varieties grown together, which shall prove valuable It was designed also to compare a few of the same varieties from the Georgia and Virginia sources to see whether there would be any differences in yields and percentages of seed and lint. Experimenters were urged to prepare soil in the common way for the seed, to apply whatever manures used as evenly as possible over the whole area in the experiment, and to give it the cultivation common to their general farming. Blanks for monthly reports were furnished and seeds sent out.

The seeds were obtained mainly from two leading sources—Alexander Drug and Seed Company, Augusta, Georgia, and T. W. Wood & Sons, Richmond, Virginia. Each substation was asked to contribute enough of home-grown seed to furnish each of the others, and to grow their own cotton and corn for comparison in the test. This arrangement gave the lists as presented. They could easily have been doubled or trebled, but the number was restricted by selection, so as not to be unwieldy.

The source of each variety of cotton or corn is shown by the initials in case of those from the seedsmen, and by giving the name of the experimenter to the corn furnished by each one, and giving the name, with the variety of cotton furnished.

A. FIELD TEST OF COTTON VARIETIES.

The seed-cotton grown at each substation was shipped to Raleigh and ginned by the Experiment Station. For this purpose a small twenty-saw Pratt gin was purchased of the Daniel Pratt Gin Company, Prattsville, Ala., which was expected to have been run and this experiment completed at the Exposition held in Raleigh October and November, 1891. The late season prevented the arrival of the crop until the closing down of the power there, and a further delay was found necessary before the work could be done by the engine owned by this Station.

The percentages of lint and seed are the result of very careful painstaking work.

1. Field Tests of Cotton Varieties.

CONDUCTED BY CAPT. W. E. ARDREY, PINEVILLE, MECKLENBURG COUNTY, N. C.

Character of Soil.—Sandy, with clay subsoil.

Field Notes.—Planted according to directions in plats of one-twentieth of an acre April 28th, 1891. Land planted to cotton in 1890, and produced over one bale of lint per acre. Prepared for this crop by running out stalks with two horses; distributed cow-stall manure, which was not weighed or measured, and bedded. Fertilized with soluble guano in drill with seed when planted. Plants did not come up until May 20th, owing to dry weather. Barred off May 24th; hoed to a stand June 1st; badly damaged by heavy hail June 4th; plowed with sweep June 13th; hoed second time June 20th and 21st; plowed third time June 26th and 27th with bull-tongue and bough. Weather during early part of season was very dry to May 20th, and wet after then till June 12th, raining nearly every day. Remainder of June favorable to growth of crop. June report gave height eight to twelve inches, and ranked plats 90 to 100. There was a poor stand on plats 1, 4, 5, 7, 9, 10, 11, 12, 13, 14, 15 and 18.

This test was planted in a peach orchard, and the following notes show that the varieties named did not completely fill the areas allotted, and some consideration is due for these interruptions when comparing results. Plat No. 7, Truitt's Premium, contained three small trees; plat No. 11, Jones' Long Staple, contained three small trees; plat No. 17, Shine's Early Prolific, contained two small trees; plat No. 18, Southern Hope, T. W. W. & Sons, contained two small trees. A later note says: Nos. 4 and 5 contained a few small fruit trees, and was shaded some; No. 12 was shaded some.

NOTE.—Owing to some confusion having been introduced into the relative position of some of the varieties in this field test, it has seemed better to drop that part of the data than to publish it with any doubt as to the identity of any of the varieties.—F. E. E.

FIELD TEST OF COTTON VARIETIES, CONDUCTED BY CAPT. W. E. ARDREY, PINEVILLE, MECKLENBURG COUNTY, N. C.

Yields and Values per One Acre.

No. of Plat.	NAME OF VARIETY.	First Picking.	Second Picking.	Third Picking.	Fourth Picking.	Fifth Picking.	Total Yield. lbs.	Per cent. of Lint.	Per cent. of Seed.	Pr ct. of loss in Ginning.	Val. of Lint at 7c. pr lb.	Val. of Seed at 17c. pr bu.	Total Value.
2	Alexander's Okra Leaf, A. D. & S. Co	280	240	200	280	200	1,200	32.38	66.77	0.85	$27.20	$4.59	$31.79
3	Bancroft's Prolific Herlong, A. D. & S. Co	80	260	160	280	400	1,180	30.05	69.44	0.51	24.82	4.68	29.50
4	Herlong, T. W. W. & Sons	60	80	100	120	600	960	30.90	68.33	0.77	20.76	3.76	24.52
5	Deering's Prolific, T. W. W. & Sons	100	100	120	160	500	980	31.03	67.88	1.09	21.29	3.82	25.11
6	George W. Truitt's Improved, A. D. & S. Co	240	180	240	340	320	1,320	31.57	68.53	+ .10	29.17	4.11	33.28
7	Truitt's Premium, T. W. W. & Sons	80	140	200	280	420	1,120	29.78	69.70	0.52	23.35	4.42	27.77
8	Hawkins' Extra Prolific, T. W. W. & Sons	160	280	240	280	440	1,400	.....	.....	.....	.....	.....	.....
9	Hawkins' Prolific, A. D. & S. Co	40	80	80	140	600	940	31.43	68.57	0.00	19.80	3.50	23.30
10	Jeff. Wellborn's Pet, A. D. & S. Co	80	140	120	200	460	1,000	30.39	67.91	1.70	21.27	3.85	25.12
11	Jones' Long Staple, T. W. W. & Sons	280	180	180	200	320	1,160	32.19	67.56	0.25	26.14	4 44	30.58
12	Peerless, T. W. W. & Sons	60	120	120	120	660	1,080	30.70	69.30	0.00	23.21	4.24	27.45
13	Peerless, Sutton's	100	160	140	260	440	1,100	31.30	68.01	0.69	24.10	4 23	28.33
14	Peterkin, Thomas (pure)	280	200	220	280	400	1,380	31.26	68.63	0.11	30.20	5.37	35.57
16	Peterkin, Ardrey	320	300	320	360	220	1,520	35.28	64.47	0.25	37.52	5.58	43.10
17	Shines' Early Prolific, T. W. W. & Sons	140	180	280	300	400	1,300	32.81	64.21	2.98	29.86	4.95	34.81
18	Southern Hope, T. W. W. & Sons	100	120	160	200	680	1,260	33.38	66.25	0.37	29.44	4.75	34.19
19	Southern Hope, A. D. & S. Co	440	260	280	360	300	1,640	31.47	67.98	0.55	36.12	6.36	42.48
20	Tennessee Gold Dust, A. D. & S. Co	340	240	240	240	560	1,620	29.03	70.28	0.69	32.90	6.52	39,42

2. Field Test of Cotton Varieties.

CONDUCTED BY MR. O. W. SUTTON, MT. OLIVE, DUPLIN COUNTY, N. C.

Character of Soil.—Sandy loam, with clay subsoil. Land is naturally well drained.

Field Notes.—Flat broken; then bedded in 3½ feet rows 150 yards long, making plats 1-27⅞, or 3-83, of an acre. Heavy application of cotton seed and acid phosphate. Seed sowed with planter April 25th. Dropped out Nos. 13 and 17. All these varieties grew beyond expectation during wet weather. Seven to nine and one-half feet tall. Southern Hope made most weed. Excessive wet weather caused shedding of flowers and young bolls, and later loss of the bolls which opened first. Very few worms, and practically no damage by them. Early varieties lost bolls by too much water, and latest ones by frost. Okra Leaf, Welborn's Pet, Tennessee Gold Dust and King's varieties were earliest and matured more bolls than the other varieties.

FIELD TEST OF COTTON VARIETIES, CONDUCTED BY MR. O. W. SUTTON, MOUNT OLIVE, DUPLIN COUNTY, N. C.

Yields and Values Per One Acre.

No. of Plat.	NAME OF VARIETY.	First Picking, Pounds.	Second Picking, Pounds.	Third Picking, Pounds.	Total Pounds.	Per Cent. of Lint.	Per Cent. of Seed.	Per Cent. of Loss in Ginning.	Value of Lint, at 7 cents.	Value of Seed, at 17 cents per bushel.	Total Value.
1	Allen's Silk, A. D & S. Co	194	221	664	1,079	28.02	71.63	.35	$21.16	$4.37	$25.53
2	Alexander's Okra Leaf, A. D. & S. Co	304	443	526	1,273	33 26	66.36	.38	29.64	4.78	34.42
3	Bancroft's Herlong, A. D. & S. Co	83	270	719	1,072	28.64	70.31	1.05	21 49	4.27	25.76
4	Herlong, T. W. W. & Sons	83	304	664	1,051	30.87	67.15	1.98	22.71	4.00	26.71
5	Deering's Prolific, T. W. W. & Sons	110	360	754	1,224	29.61	68.37	2.02	29.94	4.74	29.68
6	Geo. W. Truitt's Improved, A. D. & S. Co	124	415	913	1,452	30.99	68.38	.63	31.50	5 63	37.13
7	Truitt's Premium, T. W. W. & Son's	110	360	830	1,300	31.47	67.37	1.31	28.64	4.96	33.60
8	Hawkins' Extra Prolific, T. W. W. & Sons	83	249	768	1,100	31.66	67 64	.70	24.37	4.22	28.59
9	Hawkins' Prolific, A. D. & S. Co	97	387	885	1,369	30.32	69.29	.39	29.06	5.37	34.43
10	Jeff. Wellborn's Pet, A. D. & S. Co	304	511	774	1,589	31.91	67.48	.61	35.49	6.07	41.56
11	Jones' Long Staple, T W. W. & Sons	110	332	692	1,134	29.83	69.96	.21	23.67	4.49	28.16
12	Peerless, T. W. W. & Sons	110	415	885	1,410	32.86	67.42	+.28	32.43	5.39	37.82
14	Peterkin (Pure), Thomas	138	429	940	1,507	33.99	66.01	.00	35.85	5.64	41.49
15	Peterkin Improved	55	318	664	1,037	35.16	64.36	.48	25.52	3.77	29.29
16	Peterkin, Ardrey's	55	325	747	1,127	35 13	64.87	.00	27.71	4.15	31.86
18	Southern Hope, T. W. W. & Sons	97	443	664	1,204	28.61	68.97	2.42	24.11	4.13	28.24
19	Southern Hope	110	422	664	1,206	29.70	69.99	.31	25.07	4.78	29.85
20	Tennessee Gold Dust, A. D. & S. Co	304	608	664	1,576	31.50	68 26	.21	34.75	6 08	40.83
21	King's No. 1, T. J. King	387	664	608	1,659	33.81	66.43	.24	39.26	6.24	45.50
22	King's No. 2, T. J. King	360	636	608	1,604	33.09	65.83	1.08	37.16	5.98	43.14

3. Field Test of Cotton Varieties.

CONDUCTED BY DR. R. P. THOMAS, BETHLEHEM, HERTFORD COUNTY, N. C.

Character of Soil.—Medium sandy, with clay subsoil. Drainage good.

Field Notes.—In 1889 manured with woods mold and ashes. Yield, about 225 bushels per acre of sweet potatoes. In 1890 manured with stable manure and ashes; sweet potatoes yielded about 360 bushels per acre. Whole area one and one-half acres; each plat one-twentieth of an acre, planted according to directions.

Plowed with turn-plow last of February. March 16th, laid off rows deep and applied about 25 bushels of cotton seed per acre in drill, drew a light harrow across rows covering seed about two inches deep; then sowed in same furrow in dirt 200 pounds per acre of a high-grade guano, and listed on it. May 6th ran a cotton plow, with nothing on it but large point, splitting list and mixing seed and guano as well as could be done with nothing but point. Then relisted and bedded. Sowed seed May 7th with Cox Planter. Seed from T. W. Wood & Sons proved defective, and young plants from them died out more than any other except Jones' Long Staple. Heavy rainfall on May 30th was very damaging to cotton. Insects few, but none on these plats.

At end of May best plats were Nos. 10, 1, 3, and 17, in the order named; at end of May poorest plats were Nos. 11, 2, 7 and 18, in the order named.

By end of June cool weather had caused slow growth, but it was healthy. Best plats, Nos. 10, 1, 6, 17 and 19; poorest plats are Nos. 11, 4, 7, 15, 12 and 13.

July: 4 to 4½ feet tall, and lapped in the rows. Wellborn's Pet bloomed first. Last half of July too wet to plow, and weed grew too rapidly. Rank at end of July: Best, 10, 17, 19, 6 and 22, 1 and 20 the same; poorest, 2, 11, 4, 12, 8, 15 and 7.

August 31st, 4½ to 6 feet tall. Too much rain has run growth to weed and caused loss of fruit; most loss from Wellborn's Pet. Very little damage yet from insects. Rank for August: Best, 20, 22, 21, 19, 18, (17 and 10); poorest, 2, 11, 8, 12, (1 and 3).

FIELD TEST OF COTTON VARIETIES. CONDUCTED BY DR. R. P. THOMAS, BETHLEHEM, HERTFORD COUNTY, N. C.

Yields and Values Per One Acre.

No. of Plat.	NAME OF VARIETY.	First Picking, Pounds.	Second Picking, Pounds.	Third Picking, Pounds.	Total Pounds.	Per cent. of Lint.	Per cent. of Seed.	Per cent. of Dust & Loss.	Val. of Lint at 7c. pr lb.	Val. of Seed at 17c. pr bu.	Total Value.
1	Allen's Silk, A. D. & S. Co	242.5	685	185	1,112.5	28.61	70.78	.61	$22.28	$4.46	$26.74
2	Alexander's Okra Leaf, A. D. & S. Co	545.0	630	100	1,275.0	31.50	67.93	.56	28.11	4.91	33.02
3	Bancroft's Herlong, A. D. & S. Co	272.5	665	202.5	1,140.0	31.40	67.93	.67	25.06	4.39	29.45
4	Herlong, T. W. W. & Sons	225	635	135	995.0	-----	-----	-----	-----	-----	-----
5	Deering's Prolific, T. W. W. & Sons	340	702.5	110	1,152.5	33.26	66.29	.45	26.83	4.33	31.16
6	George W. Truitt's Improved, A. D. & S. Co	377.5	710	187.5	1,275.	31.61	67.77	.62	28.21	4.32	32.53
7	Truitt's Premium, T. W. W. & Sons	320	722.5	195	1,237.5	-----	-----	-----	-----	-----	-----
8	Hawkins' Extra Prolific, T. W. W. & Sons	230	692.5	97.5	1,020.	-----	-----	-----	-----	-----	-----
9	Hawkins' Extra Prolific, A. D. & S. Co	327.5	690	90	1,107 5	31.69	68.55	+.24	24.57	4.30	28.80
10	Jeff Wellborn's Pet, A. D. & S. Co	620	527.5	110	1,257.5	32.39	66.60	1.01	28.50	4.74	33.24
11	Jones' Long Staple, T. W. W. & Sons	182.5	530	55	767.5	28.86	69.80	1.34	15.51	2.68	18.19
12	Peerless, T. W. W. & Sons	360	685	80	1,125.	-----	-----	-----	-----	-----	-----
13	Peerless, Sutton	362.5	645	122.5	1,130.	31.93	67.36	.71	25.26	3.31	28.57
14	Peterkin (Pure), Thomas	360	687.5	92.5	1,140.	34.71	65.29	.00	27.70	4.22	31.92
15	Peterkin, Improved	240	535.0	92.5	867.5	-----	-----	-----	-----	-----	-----
16	Peterkin, Ardrey	282.5	720	57.5	1,060.	-----	-----	-----	-----	-----	-----
17	Shines' Early Prolific, T. W. W. & Sons	400	762.5	137.5	1,300.	32.30	66.87	.83	29.39	4.93	34.32
18	Southern Hope, T. W. W. & Sons	257.5	542.5	97.5	897.5	-----	-----	-----	-----	-----	-----
19	Southern Hope, A. D. & S. Co.*	252.5	582.5	125.0	960.	-----	-----	-----	-----	-----	-----
20	Tennessee Gold Dust, A. D. & S. Co	417.5	790	95	1,302.5	29 47	68.17	2.36	26.87	5.03	31.90
21	King's No. 1, T. J. King	622 5	760	85	1,467.5	33.57	64 35	2.08	34.48	5.35	39.83
22	King's No. 2, T. J. King	667.5	872.5	90	1,630	32.71	66.51	.78	37.32	6.14	43.46

*This was ginned, but one weight was questionable, hence left out.

General Conclusions.

Cotton is grown primarily for the lint, the seed being a secondary but valuable consideration. One variety of cotton is therefore more valuable than another almost in proportion as it produces more lint if the product of both varieties are of equal value per pound. Lint is known as long staple and short staple, reference being to the length of the fibers. The former is usually the more valuable, though this advantage may be lost by staining, or other causes which reduce the grade and price. In our comparisons the grading and length of staple has not been taken into account, but the whole crop has been calculated at one price—approximately what all were sold for here in Raleigh.

It will be noted that Nos. 21 and 22, which were dropped from Captain Ardrey's variety test, appear below among the best varieties in both the other tests, hence, in comparing as below for best five in the former, seven varieties are shown in the latter two tests.

The most prolific varieties in amount of seed-cotton produced were in the order named. Only No. 20 appear in all three lists: Ardrey—19, 20, 16, 8 and 14; Sutton—21, 22, 10, 20, 14, 16 and 12. Thomas—22, 21, 20, 17, (2 or 6), and 10.

The highest per cent. of lint found in the three tests were in the order named: Ardrey—16, 18, 17, 2 and 11; Sutton—15, 16, 14, 21, 2, 22 and 12; Thomas—14, 21, 5, 22, 10, 17 and 13. No one of these occur in all of the three tests, though several are found in two, viz.: Ardrey and Sutton, 16 and 2 in common, and Sutton and Thomas 14, 21 and 22; Ardrey and Thomas 17.

The highest cash values were produced in the order following: Ardrey—16, 19, 20, 14 and 17; Sutton—21, 22, 10, 14, 20, 12 and 6; Thomas—22, 21, 17, 10, 2, 6 and 14. No. 14 occurs in all three lists here, but near the foot in two. It is notable that in yield of lint, and in cash values, the varieties 21 and 22 stood at the head of the lists in which they were included, while in per cent. of lint they were fourth and sixth in one, and second and fourth in the other.

Tennessee Gold Dust came out ahead on yield of seed-cotton in the three tests, while Nos. 14, 15. 16, or Peterkin, produced the highest per cent. of lint.

In cash values produced, Peterkin is one of the best, as are, also, Jeff. Wellborn's Pet, Shines' Early Prolific, Southern Hope and Tennessee Gold Dust, while the King varieties doubtless lead.

It must be remembered there are deductions from but one year's crops, which must be taken only as indications. Other seasons may be more favorable to other earlier or later varieties, and only in several trials can the best be culled out for any given locality.

This is shown by the data for 1892.

B. FIELD TESTS OF CORN VARIETIES.

Part of the seed for these trials were purchased of T. W. Wood & Sons, Richmond, Va., and the remainder gathered as exchanges between the substations themselves. A few were not received at the experiment farm so as to be included in its variety trials.

The Insecticide Fertilizer, or worm-killer test plat, was one on which 10 pounds of *kainit* to the 1-20 acre was sown close about the hill, but not in contact with the seed, to test its reported value as a protection against cut-worms, or wire-worms. Prof. Voorhees, Chemist of the New Jersey Experiment Station, has noted that in a badly infested field one-half treated with a dressing of this salt protected the crop to a remarkable extent.

It was intended to examine the plats soon after vegetation, and as often thereafter as practicable, for damage by insects, and to compare it in this respect with an adjoining plat of the same variety not treated with kainit.

1. Field Test of Corn Varieties.

CONDUCTED BY EXPERIMENT FARM, RALEIGH, WAKE COUNTY, N. C.

Character of Soil.—Thin, gravelly soil, underlaid by red clay, which was often turned up by the plow.

Field Notes.—Cotton soil test 1889; very poor crop, worth picking only where heavily manured. The corn variety plats were laid across the original soil test plats to insure similar conditions for all. Clover failed after cotton. Black cow-peas, 1890, allowed to ripen and fall on the ground. Crimson clover sown among the peas made a good stand and moderate growth on those plats on which manuring for cotton had helped that crop, and given the best growth of cow-peavines. Whole area $1\frac{8}{24\,8}$ acre; each plat $\frac{15}{24\,8}$ acre.

In preparing for corn varieties, stable manure was spread at the rate of $7\frac{1}{2}$ cords (20 two-horse loads), or nearly 800 bushels, per acre on the plat on which the crimson clover had not made a good growth. Then it was well plowed with a heavy pair of mules, harrowed to a fine seed bed, check furrowed with a single plow, and planted in the checks 3 x 4 feet, planting three kernels in each check, one more than expected to grow.

Plowed April 24th and 25th; harrowed 25th and partly planted; planting finished 27th. All of the 11 varieties were planted 25th. The additional insecticide fertilizer plats and sorghum were planted on the 27th.

After corn was well up, harrowed with Thomas Smoothing Harrow.

May 22d, cultivated north and south, using Iron Age Cultivator. May 23d, replanted what worms had killed; in some cases fully 25 per cent of whole. All of the surface not stirred by cultivator dug over in replantlng. July 6th, cultivated with Iron Age Cultivator. July 7th, hand-hoed for grass, which is not bad but needs clearing out.

Relative rank as near as possible to obtain; as follows: June: Best, Nos. 8, 11, 10; and poorest, Nos. 6, 5, 1, in the order named. July 17th: Best, Nos. (7, 8, 9, 11) 10, 4; and poorest, Nos. 1, 3, 2.

August 5th: Average height, 9.2 feet; shortest variety, No. 1, 8 feet; tallest variety, No. 9, 10.2 feet; Nos. 8 to 11 differed by less than 3 inches in average height.

On August 5th No. 1 and No. 3 were ripe; Nos. 2 and 4 were in "thick milk" stage, and the remainder in the "roasting ear" stage.

September 3d, fodder pulled; September 7th, fodder weighed and stored; September 19th, corn harvested and dry shucks and bare stalks cut into the silo.

FIELD TEST OF CORN VARIETIES, CONDUCTED BY EXPERIMENT FARM, RALEIGH, WAKE COUNTY, N. C.

No. of Plat.	NAME OF VARIETY.	No. of ears pr acre.	Weight of ears pr acre	Wght of fodder per acre	No. matured stalks pr acre	Weight of stalk pr acre	Per ct. of perfect stand (2 stalks to the "hill.")
1	Clark's Early Mastodon	4,469	2,581	323	4,146	2,323	57.1
2	Improved Golden Dent	7,083	3,541	710	6,638	3,816	91.4
3	Improved Leaming	5,873	2,904	484	6,034	3,001	83.1
4	Blount's Prolific	6,287	3,081	613	5,308	5,631	73.1
5	Giant Broad Grain	5,292	3,654	613	5,227	4,219	72.0
6	Golden Beauty	5,373	3,227	548	5,098	2,904	70.2
7	Virginia White Gourd-seed	6,598	3,453	677	5,824	5,453	80.2
8	The Thomas (Hertford County)	7,712	4,767	839	7,131	6,461	98.2
9	The Murphy (Burke County)	6,340	3,936	839	6,663	5,550	91.7
10	The Sutton (Wayne County)	6,117	4,598	839	6,598	6,566	90.9
11	The Ardrey (Mecklenburg County)	6,970	3,904	871	6,711	6,420	92.4
	The Ardrey, Insecticide Fertilizer *a*	7,578	3,872	919.6	6,776	7,115	93.3
	The Ardrey, Insecticide Fertilizer *b*	8,107	4,199	871.2	7,938	8,664	109.3

2. FIELD TEST OF CORN VARIETIES.

CONDUCTED BY DR. R. P. THOMAS, BETHLEHEM, HERTFORD CO., N. C.

Character of Soil.—Light and sandy, with good drainage.

Field Notes.—Previous treatment and cropping has been corn in 1889, manured with 20 bushels cotton-seed per acre; yield, about 23 bushels. 1890.—One end potatoes, the other end cowpeas; stable manure and ashes applied to potatoes; yield, about 140 bushels per acre. Peas with about 500 pounds of home-made guano; yield 21 bushels per acre.

For this crop run off rows 4 feet 1½ inches apart, and bedded with turning-plow. Whole area, $\frac{15}{60}$ acre and each plat $\frac{1}{20}$ acre.

Applied 60 pounds of cotton-seed to each plat in drill. Planted April 18 by dropping two grains in each hill four feet apart and covering with a harrow, followed by a roller. Plowed first time May 9; plowed, hoed, and thinned May 13; plowed 28th. Rank: best 13, 9, 8, 12, 10; poorest, 1, 6, 4, 3, 5. June, plowed 8th, 17th, and hoed 23d; hilled and sowed in peas June 30. First tassel on plat 3, 22d; second tassel on plat 1, 23d. Geese injured replanted corn. Kainit plat best at end of month. Rank: Best, 14, 12, 16, 9, 8; poorest, 6, 1, 3, 7, 4. For July, Rank: Best, 14, 12, 16, 8, 13; poorest, 6, 3, 1, 4, 2. Numbers 1 and 3 attacked by squirrels in August, as they were earliest. Rank: Best, 14 (12, 16), 13, 8, 9; poorest, 1, 3, 4, 6, 2.

No. of Plat.	Variety of Corn.	No. Stalks per Acre.	No. Ears per Acre.	Weight of Ears, Pounds.	Bushels of 80 Lbs. per Acre.	Weight of Fodder.
1	Clark's Early Mastodon	2,460	1,500	970	12.12	243
2	Improved Golden Dent	2,580	3,120	1,621	20.26	325
3	Improved Leaming	2,500	2,040	1,111	13.89	248
4	Blount's Prolific	2,600	3,640	1,422	17.78	301
5	Giant Broad Grain	2,560	2,860	1,888	23.60	380
6	Golden Beauty	2,600	2,720	1,580	19.75	317
7	Virginia White Gourd-seed	2,540	3,600	1,612	20.15	331
8	The Thomas (Hertford county)	2,660	4,020	2,237	27.99	461
9	The Murphy Red Cob (Burke county)	2,600	2,740	1,711	21.39	391
10	The Sutton (Wayne county)	2,620	2,740	2,075	25.94	477
11	The Ardrey (Mecklenburg county)	2,600	3,540	1,901	23 77	403
12	The Crawford (Macon county)	2,580	3,860	2,362	29.53	465
13	The King (Franklin county)	2,620	3,280	2,203	27.55	482
14	The Insecticide Fertilizer plat	2,620	4,060	2,371	29.89	473

3. Field Test of Corn Varieties.

CONDUCTED BY MR. O. W. SUTTON, MT. OLIVE, DUPLIN COUNTY, N. C.

Character of Soil.—Well-drained sandy loam, with clay subsoil.

Field Notes.—Cotton grown on this land in 1890. Broke plat and bedded. Given liberal application of acid phosphate and cotton seed. Planted May 7th by hand. Plats 1-42 acre.

Observed injury on insecticide plat; probably due to contact of seed with kainit. Corn well cultivated, but dates not noted. Grew very well until silking, then unfavorable weather caused it to "fire," and this made small ears. Fodder lost by heavy rain.

No. of Plat.	Variety of Corn.	No. of Stalks Per Acre.	Weight of Ears Per Acre.	Bushels Per Acre at 80 Lbs. Per Bushel.
1	Clark's Early Mastodon	2,310	1,029	12.86
2	Improved Golden Dent	1,974	882	11.02
3	Improved Leaming	1,890	945	11.81
4	Blount's Prolific	1,932	903	11.3
5	Giant Broad Grain	1,890	903	11.3
6	Golden Beauty	1,974	840	10.5
7	Virginia White Gourd-seed	2,058	840	10.5
8	The Thomas (Hertford county)	2,058	1,218	15.2
9	The Murphy Red Cob (Burke county)	2,352	903	11.3
10	The Sutton (Duplin county)	2,268	1,155	14.4
11	The Ardrey (Mecklenburg county)	2,226	1,113	13.9
12	The Crawford (Macon county)	2,226	861	10.76
13	The King (Franklin county)	2,310	756	9.45

4. Field Test of Corn Varieties.

CONDUCTED BY CAPT. W. E. ARDREY, PINEVILLE, MECKLENBURG COUNTY, N. C.

Field Notes.—July: Plowed 8th; corn is very fine, almost every stalk has two fine ears. The varieties ranking best are Nos. (1, 4, 5), 6 (2, 7, 11). August: The season has been fine for corn, and the crop is very good. Rank: Best, Nos. 9, 10 (4 and 11) (1 and 12), in this order. Those mentioned as of specially good quality at harvest were Nos. 2, 9, 8 and 10. Plats were $\frac{1}{10}$ acre, and harvest record is given as reported in per acre yield.

No. of Plat.	Variety of Corn.	Yield Per Acre. Bushels.
1	Clark's Early Mastodon	35
2	Improved Golden Dent	40
3	Improved Leaming	38
4	Blount's Prolific	42⅛
5	Giant Broad Grain	39
6	Golden Beauty	40
7	Virginia White Gourd-seed	43
8	The Thomas (Hertford County)	41
9	The Murphy Red Cob (Burke County)	40½
10	The Sutton (Wayne County)	37
11	The Ardrey (Mecklenburg County)	41
12	The Crawford (Macon County)	42¼
13	The King (Franklin County)	39¾

5. Field Test of Corn Varieties.

CONDUCTED BY LEE CRAWFORD, FRANKLIN, MACON COUNTY, N. C.

Character of Soil.—Red clay; well drained hillside.

Field Notes.—Grew wheat on this land in 1890, without fertilizer, but had previously received stable manure and clover. Plowed May 1st with bull-tongue, then crossed and harrowed, planted and rolled. Planted May 6th; no fertilizer used. Plats were $\frac{1}{10}$ acre, check-rowed, and extend up the hillside; rows 4 feet by 3½ feet apart; two grains planted in each check. Plowed and hoed May 23d. Came up well, and very little injury from worms.

May: Rank—Best, Nos. 11, 10, 12, 9, 2, 16; and poorest, 1, 8, 7, 4, 5, in the order named.

June: Rank—Best, Nos. 4, 5, 3, 12, 14, 15, 16; and poorest, 1, 11, 7, 6, 2, in the order named. Hoed and plowed twice, on the 8th and 24th. Dry weather has checked it some. Plowed with cultivator and hand-hoed July 6th, and worked 21st. Rains have been very favorable for replanting during last half of month. All look well; three or four are later than rest. Tassels appeared on the following dates: Nos. 3 and 14 on 27th; 1 and 6 on 29th; 5, 7, 11 and 12 on 30th, and 8 and 10 on 31st.

July: Rank—Best, (10 and 14), 15, (8 and 13), 12, (2 and 11), 5; and poorest, 1, 6, 9, (7 and 4), in the order named.

August and September, 15th of each month. Rank: August—Best, 9, 11, (7 and 8), 6, 12, (1 and 4); and poorest, (2, 13 and 16) (3 and 14), 5. September—Best, 8, 9, 11, 7, 4, 6; and poorest, 16, (2 and 13), 1, 3, 14. Some well matured, while others are green yet.

Not equipped to weigh fodder easily, so it was omitted.

No. of Plat.	Variety of Corn.	Weight of Ears Per Acre.	Bushels Per Acre, at 80 lbs. Per Bus'l.
1	Clark's Early Mastodon	1,237.5	15.47
2	Improved Golden Dent	1,072.5	13.41
3	Improved Leaming	1,093	13.66
4	Blount's Prolific	1,237.5	15.47
5	Grant's Broad Grain	1,093.0	13.66
6	Golden Beauty	1,237 5	15.47
7	Virginia White Gourd-seed	1,113.7	13.92
8	The Thomas (Hertford County)	1.216	15.20
9	The Dr. Murphy Red Cob (Burke County)	1.337.6	16.72
10	The Sutton (Wayne County)	1,534.6	19.18
11	The Ardrey (Mecklenburg County)	1,637.6	20.47
12	The Crawford (Macon County)	1,237.5	15.47
13	The King (Franklin County)	1,340.5	16.76
14	The Insecticide Test Plat	1,637 6	20.47
15	The Lindsay (Rockingham County)	1,113.7	13.92

Deductions from the Corn Variety Tests.

1. The yields of corn varieties were much more variable between the same varieties in different localities than between varieties at any one place, while variety differences are somewhat exaggerated by the earlier ripening of three or four varieties which are given first in the table.

2. At three points the differences as shown were between five and three-fourths ($5\frac{3}{4}$) and eight (8) bushels, while they were greater at two points.

3. For the sake of uniformity, and because shelling and drying-out tests were not made, all were calculated at 80 pounds to a bushel of shelled corn; yet with whatever exaggeration there may be, the variety differences are small as compared with the differences of land and treatment. These emphasize the value of putting the land in condition to grow a good crop.

4. Judging from the average at five points in the State, the varieties now being grown were more prolific than those bought outside of the State.

5. For early maturity, Nos. 1, 6 and 3 were first in the order named.

6. Much more can be realized from the varieties of corn and other crops which we have on hand if care is exercised to enrich the soil enough to produce a good crop and in the subsequent plowing and cultivation, than can be obtained from any varietal differences. Differences between varieties are considerable, but the other conditions surrounding our crops are overshadowing.

SUMMARY OF RESULTS WITH CORN VARIETIES.

No. of Plat.	Variety of Corn.	Yield in Bushels per Acre.						Lbs. Fodder per Acre.	
		W. E. Ardrey, (Mecklenburg Co.)	Lee Crawford, (Macon Co.)	Experiment Farm, (Wake Co.)	O. W. Sutton, (Duplin Co.)	R. P. Thomas, (Hertford Co.)	Average Yields.	R. P. Thomas, (Hertford Co.)	Experiment Farm, (Wake Co.)
1	Clark's Improved Mastodon	35	15.5	32.3	12.9	12.1*	21.5	244	333
2	Improved Golden Dent	40	13.4	44.3	11.0	20.3	25.7	325	710
3	Improved Leaming	38	13.7	36.3	11.8	13.9	22.7	249	484
4	Blount's Prolific	42.1	15.5	38.5	11.3	17.8	25	301	613
5	Giant Broad Grain	39	13.7	45.7	11.3	23.6	26.6	380	613
6	Golden Beauty	40	15.5	40.3	10.5	19.8	25.2	318	548
7	Virginia White Gourd-seed	43	13.9	43.7	10.5	20.2	26.1	331	677
8	The Thomas (Hertford Co.)	41	15.2	59.6	15.2	28.0	31.8	461	839
9	The Murphy (Burke Co.)	40.5	16.7	49.2	11.3	21.4	27.8	391	839
10	The Sutton (Duplin Co.)	37	19.2	57.5	14.4	25.9	30.8	478	839
11	The Ardrey (Mecklenburg Co.)	41	20.5	48.8	13.9	23.8	29.5	403	871
12	The Crawford (Macon Co.)	42.1	15.5	------	10.8	29.5	24.4	465	----
13	The King (Franklin Co.)	39.8	16.8	------	9.5	27.6	23.3	483	----
14	Insecticide fertilizer plat	------	20.5	51.9	------	29.9	------	464	----
15	The Lindsay (Rockingh'm Co.)	------	13.9	------	------	------	------	----	----

*Badly damaged by squirrels.

Weights as harvested are multiplied to indicate bushels per acre, and pounds per acre of fodder.

All are calculated at 80 pounds per bushel on harvest weights. Plats 1, 2 and 3 were earlier than others, and in all probability less than 80 pounds would have shelled out a bushel in each test.

7. *Insecticide Fertilizer.*—There is little to report from the various substations, for the reason that at most of them there was little or no interference by insects. At one station there was a poor stand on the plat, charged to the kainit, and probably due to planting the seed in contact with the salt. At one other station there were worms, but replants on this plat were more numerous than on some of the plats without.

At the Experiment Farm the varieties were planted April 25th on the freshly worked land, but the insecticide plat was not planted until the 27th, when the soil had dried considerably. The kainit was sprinkled in the furrow where the seed was to be planted and slightly mixed with soil, and seed covered with fresh soil. Dry, hot weather continued several weeks after planting. The eleven variety plats vegetated regularly and quickly, but the insecticide fertilizer plat did not germinate for some time, and then very irregularly. This was ascribed to the dry condition of the soil when the planting was done. On May 21st the plats were carefully examined, and all

the live and dead plants on two rows of plat 11, which had not the kainit, were counted. A perfect stand would have been 450 plants. Found 331 alive and 87 dead Of 418 plants which had vegetated, 87 or 20 81 per cent. had been killed by cut-worms. The fertilizer had been put on the four rows next adjoining the two on which the counts were made. Each two rows had received at the rate of 242 pounds per acre of kainit, and were planted with same variety of corn. On these the following result was obtained: First two rows for perfect stand, 450 plants; found alive, 208; dead, 23; equivalent to dead, 9 96 per cent. Second two rows for perfect stand, 450 plants; found alive, 67; dead, 11; equivalent to dead, 14.1 per cent.

Of the corn which vegetated seasonably, 9.16 per cent. was saved by the application. Or, to put the result in another form, 46.87 per cent. of the corn liable to attack was saved. These plats were just in the season for most destructive work by worms. Corn planted much earlier in the same field, but which had received different treatment, did not require replanting, and the replants made on these plats, May 23d, were comparatively free from molestation.

RESULTS OF CO-OPERATIVE WORK FOR 1892.

Results of the work for this year have not been as complete, nor received with the same promptness, as for last year. One substation (at Morganton) discontinued its work for lack of time to give attention to the details. At another, continued ill health made it necessary to transfer or drop the work, hence there has been a loss. The results received from Dr. Thomas, in Hertford county, in the test of cotton varieties is worthy of attention. Very good crops of these varieties were secured, although the seasan was unfavorable. Crops were nearly drowned out in June and July by continuous and excessive rains. Crops at the substation in Franklin county have fared badly from flood or drought, and we have no complete records from there another season. Good work has also been done by the substations in Macon, Mecklenburg, Duplin and Rockingham counties, though the results from the tobacco experiments are not all received, and some will necessarily be held until a later date.

Grasses at the Substations.

A variety of grasses have been tried at all the substations, yet no substantial success has been reported. Annual weeds, with which the grounds are filled, overcome spring sowing, and fall sowings have yielded to fall droughts, aud perhaps lack of the right kind of encouragement. There are two periods when it is safe to sow grasses here: a little past midsummer when the young plants can get sufficient start under the influence of the warm moist weather and frequent rains to withstand the fall drought; and immediately after or during the last days of dry weather of October or November. Sown at either of these times on moderately rich land and given a liberal mulch of stable manure, a considerable number of grasses will thrive and give good crops of hay.

The grass seeds which were distributed to substations were intended for seventeen plats of one-thirtieth of an acre each.

The varieties were:

Red Top (*Agrostis vulgaris*), Tall Oat Grass (*Avena elatior*), Meadow Foxtail (*Alopecurus pratensis*), Crested Dogstail (*Cynosurus cristatus*), Orchard Grass (*Dactylis glomerata*), Tall Fescue (*Festuca elatior*), Meadow Fescue (*Festuca pratensis*), Sheeps Fescue (*Festuca ovina*), Italian Rye (*Lolium Italicum*), Perennial Rye (*Lolium perenne*), Timothy (*Phleum pratense*), English Blue Grass (*Poa compressa*), Kentucky Blue Grass (*Poa pratensis*), Fowl Meadow Grass (*Poa serotina*).

With these grasses, a few clovers and other legumes were sown:

Alfalfa or Lucerne (*Medicago sativa*), Alsike Clover (*Trifolium hybridum*), Red Clover (*Trifolium pratense*), Japan Clover (*Lespedeza striata*), Spring Vetch (*Vicia sativa*), Winter Vetch (*Vicia sativa*).

The vetch was sown with oats for support to vines.

1. Soil Test with Cotton.

CONDUCTED BY CAPT. W. E. ARDREY, PINEVILLE, MECKLENBURG COUNTY, N. C., 1892.

Character of Soil.—Sandy soil, with surface drainage.

Field Notes.—Growth for two years previous, about 800 pounds of seed-cotton per acre, on manure composted with acid phosphate.

Land plowed March 1st, 1892, with two-horse plow, then listed or double-furrowed and laid off across the lists; the manure applied and bedded April 26th.

Whole area, four-fifths of an acre; each plat one-thirtieth of an acre.

Southern Hope Cotton planted with cotton-planter April 27th, 1892. Plowed May 15th; hoed May 20th; plowed again June 10th; hoed June 16th; plowed June 30th, and again July 15th.

On July 15th the best plats were Nos. 8, 14 and 21, with seven other plats only five points lower. On July 30th the same plats led in the same order, with the same ones next best. The poorest at that time were 1, 2, 5 and 11, with 12, 15 and 17 very little better.

Value of seed-cotton calculated from Southern Hope in variety test, where it was worth nearly $30.28 per 1,000 pounds.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with average of three unfertilized plats, after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield, Seed Cotton.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Pounds.	Average Pounds.	Value.	Net Gain.	Net Loss.	
1 12	450	-------	-------	$ 3.72	1,110 1,110	1,110	$33.61	------	$0.69	9
2 11 17	-------	-------	-------	.00	1,020 960 1,050	1,010	30.58	------	------	--
3 13	300	150	75	4.92	1,260 1,500	1,380	41.79	$6.29	------	3
4 14	-------	600	-------	7.20	1,590 1,560	1,575	47.69	9.91	------	1
5 15	-------	-------	450	3.38	930 1,140	1,035	31.34	------	2.62	11
6 16	300	150	-------	4.28	1,080 1,320	1,200	36.34	1.48	------	6
7 18	300	-------	225	4.17	1,050 1,320	1,185	35.88	1.13	------	7
8 21	30 two-horse stable manure.		loads	30.00	1,890 1,650	1,770	53.60	------	6.98	12
9 19	-------	300	300	5.85	1,176 1,410	1,290	39.06	2.63	------	5
10 20	150	150	150	4.17	1,200 1,440	1,320	39.97	5.22	------	4
22	Crush.	Cot. Seed, 1200 lbs.		8.00	1,230	-------	37.24	------	1.34	10
23	Acid Phos. and Cot. Seed Comp't,		600 lbs.	7.50	1,290	-------	39.06	.98	------	8
24	Ammoniated	600 lbs.	Guano,	7.00	1,530	-------	46.33	8.75	------	2

Conclusions.—In this soil nitrogen was the element needed most. Phosphoric acid or potash alone failed to increase the yield. Stable manure made a remarkable advance in the crop, but heavy cost kept it at bottom of list.

2. Soil Test with Cotton.

CONDUCTED BY MR. O. W. SUTTON, MT. OLIVE, DUPLIN COUNTY, N. C., 1892.

Character of Soil.—Sandy land on clay subsoil. Naturally well drained.

Field Notes.—Land rested during 1890; planted to cotton in 1891; manured with compost, cotton seed, and phosphate.

This year bedded on five furrows. Planted and fertilizers applied according to instructions. Planted April 21st with Cox Planter. Plats very nearly 1-22 acre.

June report ranks all plats from 1 to 3. Those ranked "1" are Nos. 3, 6, 13, 14, 16, 19 and 20; "2" are 1, 4, 5, 7, 9, 10, 12, 15 and 18; all others are ranked "3." It has been too dry for the coarse manure from hog-pen on the stable manure plat.

July report shows a rather poor condition. Best plats are 14, 13 and 9; the poorest are 2, 11, 15, 17 and 21, all ranked about alike.

September report, recording the first picking, reaffirms that the coarse hog manure has done harm in this dry season.

For calculating the values in the table below an average per cent. of seed and lint in five ginned samples of Peerless seed-cotton has been taken. This varies from the percentages used in the variety test, 1892, taken from Thomas' plat of 1891, by only 0.05 per cent. less seed and 0.26 per cent. more lint. Percentages used are: seed, 67.31; lint, 32.19; waste or loss, 0 50. Value of 1,000 pounds of seed-cotton, $30.24.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with average of three unfertilized plats after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Pounds.	Average Pounds.	Value.	Net Gain.	Net Loss.	
1 12	330	-------	-------	$ 2.73	654.5 902	778½	$23.53	$1.17	------	8
2 11 17	-------	-------	-------	.00	704 748 495	649	19.63	------	------	--
3 13	220	110	60	3 55	1,045 880	962½	29.11	5.93	------	3
4 14	-------	440	-------	5 28	1,138 990	1,064	32.18	7.27	------	2
5 15	-------	-------	330	2.48	847 968	907½	27.44	5.33	------	5
6 16	220	110	-------	3.13	946 946	946	28.61	5.85	------	4
7 18	220	-------	165	3.06	913 759	836	25.88	3.19	------	7
8 21	22 two-horse stable	loads manure.		22.00	704 605	654½	19.79	------	$21.84	9
9 19	-------	220	220	4.29	1,067 1,012	1,039½	31.43	7.51	------	1
10 20	110	110	110	3.06	979 814	896½	27.11	4.42	------	6

Conclusions.—All the fertilizers paid well except phosphoric acid alone. Nitrogen and potash were the dominant elements, but potash alone did not do so well as nitrogen alone. The prominent feature of this soil test is the action of a heavy application of organic manure insufficiently covered. It dries out and does harm rather than good. Had this same amount been sown broadcast and plowed in, it would doubtless have found moisture at that depth and helped the crop in this dry season.

1. Soil Test with Corn.

CONDUCTED BY T. B. LINDSAY, DOUGLAS, ROCKINGHAM COUNTY, N. C., 1892.

Character of Soil.—Poor old field. Chocolate color, sandy, and part of it does not scour well. Planted in corn in 1891; yield, two barrels to the acre. For five years before, nothing.

Field Notes.—Plowed in March with one-horse turn-plow; cross plowed with shovel and harrowed. Each plat one rod wide by eight rods long; one twentieth of an acre. Followed directions, except fertilizers were mixed with an equal amount of earth from the field and drilled in furrow May 27th, 1892. June 16th, cultivated with Iron Age Cultivator and thinned.

Rank at end of June: Best, 6, 13, 3, 16 and 10, in this order; poorest, 11, 17, 15, 18, 8 and 1, in this order.

July 12th, cultivated with Iron Age Cultivator. Wet weather prevented proper cultivation in the early season.

Rank at end of July: Best, 3, 13, 14, 4 and 8, in this order; poorest, 11, 17, 2, 12 and 11, in this order. No change discernible from this ranking for August.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with average of three unfertilized plats after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Bushels of 80 Lbs.	Average Bushels.	Value at 50c. per Bushel.	Net Gain.	Net Loss.	
1 12	300	.....	.....	$ 2.48	15 13.25	14.12	$7.06	.....	$0.42	5
2 11 17	.....	.....	.....	.00	12 9 9	10	5.00	.....	.....	--
3 13	200	100	50	3.23	18.75 17	17.88	8.94	$0.71	.....	1
4 14	.....	400	.....	4.80	18 16.5	17.25	8.63	.....	1.17	7
5 15	.....	.....	300	2.25	16.75 13 25	15	7.50	0.25	.....	2
6 16	200	100	.....	2.85	16.5 15.25	15.88	7.94	0.09	.....	3
7 18	200	.....	150	2.78	16.25 14.5	15.38	7.69	.....	0.09	4
8 21	20 tw stable	o-horse manu	loads re.	20.00	17.5 13.75	15.63	7.81	.....	17.19	9
9 19	.....	200	200	3.90	12.75 15	13.88	6.94	.....	1.96	8
10 20	100	100	100	2.78	16.75 12	14.38	7.09	.....	0.69	6

Conclusions.—This experiment is a part of an effort to reclaim waste land. Three applications have increased the yields enough to return cost. The best one was a complete fertilizer. The plan was to grow cow peas on half of these plats among the corn and watch results on next year's crop.

2. Soil Test with Corn.

CONDUCTED BY LEE CRAWFORD, FRANKLIN, MACON COUNTY, N. C., 1892.

Character of Soil.—Clay soil.

Field Notes.—Plats 272 x 8 feet; equal to one-twentieth of an acre very nearly. Previous crop, wheat, dressed with light coat of stable manure; yield, ten bushels per acre. Prepared for this crop by plowing, cross-plowing and harrowing. Fertilizer dropped in hills every two feet, and corn dropped beside it, April 28th.

Rank of best and poorest plats May 15th and 30th was in the order named, giving best first, Nos. 6, 16, 12, 13, 14; poorest first, Nos. 2, 4, 5, 7 and 9.

Plats were plowed and hand-hoed on the 13th and 31st.

In June, cultivated 16th, hoed 17th.

Rank in same order as above: Best, 6, 12 or 3, 14, 4; poorest first, 5, 2, 11, 17, 15.

Plats worked again July 10th.

Rank in order of best first and poorest first: Best, 6 or 18, 14, 16, 8, 3; poorest, 11, 17, 2, 9, 10.

Weather very dry in August.

Rank as above: Best, 7, 18, 20, 4, 6; poorest, 17, 11, 2, 5, 15.

This soil test was put on better land than that of 1891.

RESULTS PER ONE ACRE.

[Net gain and net loss show comparison with average of three unfertilized plats after subtracting cost of application.]

Plat Nos.	Application in Pounds.			Cost.	Yield.			Results.		Rank.
	Acid Phosphate.	Cotton-Seed Meal.	Kainit.		Bushels of 80 Lbs.	Average Bushels.	Value at 50c. per Bushel.	Net Gain.	Net Loss.	
1 12	300	.....	.....	$ 2.48	32 26.25	29.12	$14.56	$1.20	....	1
2 11 17	.....	.....	.....	0.00	25.00 20.75 19.5	21.75	10.88	.....	.....	..
3 13	200	100	50	3.23	27 27	27	13.50	.....	$0.61	3
4 14	.....	400	.....	4.80	27.5 22.5	25	12.50	.....	3.18	6
5 15	.....	.....	300	2.25	22.5 23.0	22.75	11.38	.....	1.75	5
6 16	200	100	.....	2.85	30 25.5	27.75	13.88	0.15	.....	2
7 18	200	.....	150	2.78	27.5 22	24.75	12.38	.....	1.28	4
8	20 2-h'se	l'ds st'b.	manure	20.00	31.25	31.25	15.63	.....	15.25	9
9 19	.....	200	200	3.90	22 20	21	10.50	.....	4.28	8
10 20	100	100	100	2.78	20 19.50	19.75	9.88	.....	3.78	7

Conclusions.—Only the acid phosphate alone and in combination with cotton-seed meal in least amount gave increase enough to pay for the application. The dry weather in August doubtless prevented the fertilizers, and especially stable manure, from pushing the crop, and made those applications a hindrance rather than a benefit. Had the application been made broadcast, the drought would have had less effect on it, and more rain when needed, in most cases, would have increased the crop to a profitable yield.

1. Field Test of Cotton Varieties.

CONDUCTED BY CAPT. W. E. ARDREY, PINEVILLE, MECKLENBURG COUNTY, N. C., 1892.

Character of Soil.—Sandy soil, without drainage.

Field Notes.—Yield for two years, about 1,000 pounds of seed-cotton per acre, bedded in the usual way, using compost in drill. Plats one-thirtieth acre each. The land was prepared by bedding in the usual way and applying 2,000 pounds compost of acid phosphate and stable manure per acre. Seed drilled in by hand April 1st. No other fertilizer sown.

The yields this year have been best from plats 25, 1 and 10, with highest per cent. of lint from plats 14, 15, 1, 16 and 7; highest cash value from Nos. 15, 1, 10 and 14.

FIELD TEST OF COTTON VARIETIES, CONDUCTED BY CAPT. W. E. ARDREY, PINEVILLE, MECKLENBURG COUNTY, N. C.

Yields and Values per One Acre.

No. of Plat.	Name of Variety.	First Picking, Pounds.	Second Picking, Pounds.	Third Picking, Pounds.	Total Yield of Seed Cotton, Pounds.	Per Cent. of Lint.	Per Cent. of Seed.	Per Cent. of Loss in Ginning.	Value of Lint at 8c. per Pound.	Value of Seed at 20c. per Bushel of 30 Pounds.	Total Value per Acre.	Rank.
1	Allen's Silk	990	300	120	1,410	35.49	64.51	0.00	$40.01	$6.06	$46.07	2
2	Alexander's Okra Leaf	660	240	120	1,020	33.98	65.46	0 56	27.72	3.45	31.17	17
3	Bancroft's Herlong	510	360	180	1,050	32.39	67.36	0 27	27.30	4.71	32 01	15
4	Herlong	570	420	120	1,110	33.07	66.93	0.00	29.37	4.95	34.32	12
5	Deering's Prolific	510	300	150	960	32 30	67.70	0.00	24.81	4.33	29.14	20
6	Geo. W. Truitt's Improved	480	360	150	990	33.05	66 11	0.84	26.17	4.37	30 54	19
7	Truitt's Premium	780	270	120	1,170	34.93	65.20	+0.13	32.64	5.07	37.71	7
8	Hawkins' Prolific	630	390	180	1,200	33.38	66.75	+0.13	32.04	5.34	37.34	8
9	Hawkins' Prolific	540	420	180	1,140	33.28	66.72	0.00	30.35	5.07	35.42	11
10	Wellborn's Pet	840	270	120	1,230	33.62	66.67	+0.29	33.00	5.46	38.46	3
11	Jones' Long Staple	630	240	120	990	33.33	66.47	0.20	26.40	4.38	30 78	18
12	Peerless	630	300	210	1.140	33.59	66.11	0 30	30 63	5.03	35 66	10
13	Sutton's Peerless	660	360	180	1,200	34.05	65.95	0.00	32.69	5.28	37.97	5
14	Thomas' Peterkin	540	390	210	1,140	36.47	63 85	+0.32	33.27	4.85	38 12	4
15	Peterkin, Improved	840	510	180	1,530	36 07	64.07	+0.14	44.14	6.54	50 68	1
16	Ardrey's Peterkin	630	330	210	1,170	35.09	64.62	0.31	32.85	5.03	37.88	6
17	Shine's Early Prolific	660	300	180	1.140	35.59	66.87	+0.46	30 63	5.08	35.71	9
18	Southern Hope (T. W. W. & Sons)	480	420	180	1.080	32.14	68.58	0.29	27.77	4.93	32.70	14
19	Southern Hope (A. D. & S. Co.)	480	390	210	1,080	31.06	68.32	0 62	26.84	4.92	31.76	16
20	Tennessee Gold Dust	660	300	150	1,110	32.04	67.96	0.00	28.46	5.02	33.48	13

2. Field Test of Cotton Varieties.

CONDUCTED BY MR. O. W. SUTTON, MT. OLIVE, DUPLIN COUNTY, N. C., 1892.

Character of Soil.—Heavy clay land; natural drainage.

Field Notes.—Corn grown in 1890, and cotton on heavy application of compost in 1891.

Bedded on five furrows for this crop. Plats 1-35 acre. A liberal dressing of compost of cotton seed and barn-yard manure. Planted with Cox planter.

June: Plats all very good; Nos. 2 and 10 may lead, but not very much. Very little damage from insects to date. Plats show mixing from varieties being grown together last year.

July: Growth, 3 to 5½ feet tall; fruiting well, especially Southern Hope.

First picking was in September.

These cotton varieties were not ginned out this year, but to complete the following table the percentage of the same varieties produced on this farm in 1891 have been used, except as noted for a variety we did not gin from this place.

Best yields of seed cotton are from plats 6, (9 and 21), 10, (5, 8 and 13). Relative percentage of lint and seed cannot be shown. Based on the previous year's rate, the greatest net increase would be from plats, 21, 15, 6, 10 and 12.

FIELD TEST OF COTTON VARIETIES, CONDUCTED BY MR. O. W. SUTTON, MOUNT OLIVE, DUPLIN COUNTY.

No. of Plats.	Name of Variety.	First Picking, Pounds.	Second Picking, Pounds.	Third Picking, Pounds.	Total Seed Cotton, Pounds.	Value of Lint at 8c. per Pound.	Value of Seed at 20c. per Bushel of 30 Pounds.	Total Value.	Rank.
1	Allen's Silk	280	450	367.5	1,102.5	$24.71	5.26	$29.97	22
2	Alexander's Okra Leaf	700	682.5	315	1,697.5	45.17	7.51	52.68	17
3	Bancroft's Herlong	385	980	525	1,890	43.30	8.84	52.14	18
4	Herlong	315	814	455	1,584	39.12	7.09	46.21	21
5	Deering's Prolific	595	910	560	2,065	48.91	9.41	58.32	12
6	Geo. W. Truitt's Improved	700	989	534	2,222.5	55.10	10.13	65.23	3
7	Truitt's Premium	420	945	595	1,960.0	49.34	8.78	58.12	13
8	Hawkins' Prolific (T. W. W. & Sons)	525	1,015	525	2,065	52.30	9.31	61.61	9
9	Hawkins' Prolific (A. D. & S. Co.)	560	1,050	560	2,170	52.63	10.02	62.65	6
10	Wellborn's Pet	665	1,059	385	2,109	53.84	9.49	63.33	4
11	Jones' Long Staple	595	1,027.5	490	2,012.5	48.02	9 39	57.41	15
12	Peerless (Wood)	595	1,041	402.5	2,039	53.60	9.16	62.76	5
13	Sutton's Peerless	647.5	1,050	367.5	2,065	52.75*	9.27*	62.02	7
14	Thomas' Peterkin	612.5	997.5	350	1,960	53.30	8.62	61 92	8
15	Peterkin Improved	560	1,015	455	2,030	57.10	8.71	65.81	2
16	Ardrey's Peterkin	420	910	490	1,820	51.15	7 87	59.02	11
17	Peerless, Sutton (?)	630	1,024	350	2,004	51.19*	9.00*	60.19	10
18	Southern Hope (T. W. W. & Sons)	490	892.5	472.5	1.855	42.46	8.53	50.99	20
19	Southern Hope (A. D. & S. Co.)	770	910	350	2.030	48.23	9.47	57.70	14
20	Tennessee Gold Dust	490	822.5	437.5	1,750	44.11	7.96	51.07	19
21	King's No. 1	805	1,050	315	2,170	58.69	9.61	68.30	1
22	King's No. 2	595	919	280	1,794	47.49	7.87	55.36	16

* By per centages of seed and lint from Dr. R. P. Thomas' plat.

3. Field Test of Cotton Varieties.

CONDUCTED BY DR. R. P. THOMAS, BETHLEHEM, HERTFORD COUNTY, N. C., 1892.

Character of Soil.—Stiff clay soil, with yellow, sticky clay subsoil. Drainage good.

Field Notes.—Cotton yield per acre in 1890, 1,550 pounds; 1891, 1,400 pounds. Home-made guano used.

Plowed with two-horse plow in February, with cutaway harrow in March, and listed in April. Whole area one-fourth of an acre; each plat one-fortieth of an acre. Home-made guano, 60 pounds per plat, applied; rate of 2,400 pounds per acre. Seed sown May 3d with Cox Planter.

June No insects of any consequence. Cotton 10 to 30 inches high, and suffering from effects of wet weather. Ranked on scale of 100 points for best: No. 10 ranks 100; No. 9, 95; Nos. 8 and 6, 90; Nos. 1, 5 and 7, 85; No. 4, 90; No. 3, 82, and No. 2, 75.

July 6. Have had rain nearly every day for three weeks; about nine inches in 36 hours June 27th and 28th; constant rain for 52 hours at time of writing. Crops drowned.

(Owing to illness of himself and family, Dr. Thomas was unable to give the regular attention required to make the monthly reports, hence they are necessarily omitted.

Conclusions.—Dr. Thomas reduced his varieties to eight of the most interesting ones, and added Little Brown. These were not ginned by the Experiment Station, so we are unable to give per centages accurately. They have been computed on those of 1891. The yields have been best from plats 1, 5, 2, 6 and 3; or, using old numbers, Little Brown, 14, 2, 17 and 6. Considering the flooding, these varieties have done remarkably well.

Comparing these varieties from the three substations in the single item of yield, we find the following: Ardrey, best, 15, 1, 10, (8 and 13) and 16; Sutton, best, 6, (9 and 21), 10, (5, 8 and 13); Thomas, best, Little Brown, 14, 2, 6 and 17.

This year there is more uniformity in respect to yields than there was last year. In the two full tests, No. 10 is third best, and Nos. 8 and 13 are tied as fourth best. Two have a Peterkin as first best in yield, while in the ginning test Peterkin has the highest per cent. of lint and highest cash value per acre.

FIELD TEST OF COTTON VARIETIES, CONDUCTED BY DR. R. P. THOMAS, BETHLEHEM, HERTFORD COUNTY, N. C.

No. of Plats.	NAME OF VARIETY.	First Picking, Pounds.	Second Picking, Pounds.	Third Picking, Pounds.	Total Seed Cotton, Pounds.	Per Cent. of Seed, 1891.	Per Cent. of Lint, 1891.	Value of Lint.	Value of Seed.	Total Value.	Rank.
1	Little Brown	682.5	580	452.5	1,715						
2	Alexander's Okra Leaf	520	615	500	1,635	67.93	31.51	$41.22	$7.40	$48.62	2
3	Geo. W. Truitt's Improved	362.5	812.5	415	1,590	67.77	31.61	40.21	7.18	47.39	3
4	Wellborn's Pet	687.5	530	200	1,417.5	66.60	32.39	36.73	6.29	43.02	5
5	Thomas' Peterkin	495	652.5	562.5	1,710	65.29	34.71	47.48	7.44	54 92	1
6	Shine's Early Prolific	620	662.5	332.5	1,615	66.87	32.30	39.17	7.20	46.37	4
7	Tennessee Gold Dust	760	435	150	1,345	68.17	29.47	31.71	6.11	37.82	8
8	King's No. 1	875	320	185	1,380	64.35	33.57	37.06	5.92	42.98	6
9	King's No. 2	897.5	285	80	1,262.5	66.51	32.71	33.04	5.58	38.62	7

1. Field Test of Corn Varieties.

CONDUCTED BY LEE CRAWFORD, FRANKLIN, MACON COUNTY, N. C., 1892.

Character of Soil.—Bottom land, upon clay. Natural drainage.

Field Notes.—Corn grown last year with dressing of stable manure.

Plowed in winter and harrowed. Plats, 4½ x 528 feet, equal to one-twentieth of an acre. In rows, then planted and covered with two furrows. Seed planted May 6th. Plowed well and hoed May 28th. Worms very bad this year. Rank of plats on 15th and at end of month averaged: 4, 1 and 6, 5, 2, 3.

Plowed June 13th and hoed 15th. Rank averaged as above: 2, 1, 3, 4. (Nos. 5 and 6 seem to have been dropped.)

Worked July 28th. Rank for July, averaged as above, 1, 2, 3, 4.

August. Dry weather injured crop. Rank, averaged as above, 1, 4, 2, 3.

No. of Plat.	Name of Variety.	Per Cent. of Replants.	Yield per Acre, Lbs.	Bushels of 80 Lbs.	Rank.
1	The Crawford Corn (Macon Co.)	8.3	1,560	19.5	1
2	The Ardrey Corn (Mecklenburg Co.)	10.4	1,400	17.5	3
3	The Sutton Corn (Duplin Co.)	16.0	1,460	18.25	2
4	The Dr. Murphy, or Red Cob, Corn (Burke Co.)	8.0	1,400	17.5	3
5	The Rival Corn	8.9	1,360	17.0	4
6	The Old Cabin Home	8.4	1,460	18.25	2

These varieties were reduced to the most promising, and Rival and Old Cabin Home added. The yields of the six varieties are very close, and this, considered with the per cent. of replants caused by insect ravages, shows less harm to have been done to the home-grown seed, though so small as probably to be accidental. With less damage, No. 3 would have produced more crop and probably led in total yield. The cobs in that variety are very large, hence it probably produced the least merchantable shelled corn of the six varieties compared.

CO-OPERATIVE HORTICULTURAL WORK.

By W. F. MASSEY, Horticulturist.

The experimental work in the section near Newbern was placed in the hands of Mr. Daniel Lane, and consisted mainly of fertilizer experiments upon garden vegetables, and tests of fruits. Incidentally, some work is also being done by Mr. Lane in testing the capacity of a mixture of grasses for permanent pasture in the flat lands of the coast plain. The work at this substation was begun at a rather advanced period in spring, and the fertilizer work was largely confined to tests to demonstrate the value of nitrogenous top dressings during the season of growth. A top dressing of 100 pounds per acre of nitrate of soda was used on part of a plat of Irish potatoes that had received at planting a dressing of 1,000 pounds per acre of an ammoniated potato fertilizer. Unfortunately, we had not unfertilized portions to use as checks, and the only comparison was between two portions of a heavily fertilized area, one of which was top-dressed with the nitrate and one not so treated. The crop of the part top-dressed with nitrate showed an increase in total bulk of crop of 20 per cent. over the undressed part, and the unnitrated potatoes were of unusual size. It was noticed, too, that the top dressed portion showed a larger portion of diseased or rotten potatoes than that which had no additional nitrogen. Another portion top-dressed with cotton-seed meal showed very little increase in crop, and a more decided increase of disease. A series of our most promising seedling strawberries were placed in Mr. Lane's hands for test. These will be in full crop the present season, and we hope for something valuable. A number of varieties of figs have also been planted. There has not yet been sufficient time to determine whether any of them possess special merits for that section over the older sorts.

At Southern Pines some work was undertaken by Mr. C. D. Tarbell in comparing the effects of different fertilizing ingredients upon the growth of grape vines. No results of great value were obtained, further than to demonstrate that in the sandy soils of that section, which are very deficient in humus, nitrogen is essential in some form for promoting the early growth of the grape vine; but that on old and well-established vines, where peas have been used as a renovating growth upon the land, it is no longer essential, and may be injurious in placing vines under conditions more readily to invite the growth of parasitic fungi.

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